ESTIMATING BLACK BEAR POPULATION DENSITY IN THE SOUTHERN BLACK BEAR RANGE OF NEW YORK WITH A NON-INVASIVE, GENETIC, SPATIAL CAPTURE-RECAPTURE STUDY

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Catherine Sun

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ABSTRACT

Estimating population density and describing spatial patterns are important in conservation and management of wildlife populations. We conducted a non-invasive, genetic, spatial capture-recapture study of black bears (*Ursus americanus*) in a region of New York in 2011 and 2012 where its range has expanded in order to 1) estimate population density, 2) test for spatial patterns of range expansion related to landcover, and 3) evaluate patterns of genetic diversity. Estimated population density was 9 bears / 100 km^2, low compared to other black bear populations in the U.S. We identified patterns in density and detection probability related to landcover types that differed from expected patterns of resource use. Genetic diversity was comparable to that of non-expanding black bear populations, but we also detected a potential signature of population admixture. In addition, we conducted simulations investigating the effects of different sampling designs on population estimation in large mammal studies. Spatially clustered sampling devices resulted in the most accurate and precise estimates, and performance differences between designs diminished as home range size increased.

BIOGRAPHICAL SKETCH

Born in 1988, Cat grew up in suburban Delaware. She quickly discovered that she preferred spending time outside, poking at ants and climbing trees, to dying in video games. Exploring coastal wetlands and weekend trips with her family to state parks cemented her love for nature and all the questions that could be asked in ecology and biology. In high school, she participated and competed in Envirothon, an environmental education program focused on ecology and natural resource management. These childhood activities transformed Cat's appreciation of nature and wildlife to a passion for its study and conservation. In 2010, Cat earned her Bachelors of Science in Biology with a Concentration in Ecology and Organismic Biology from the University of Delaware. In the fall of 2010, she started graduate work at Cornell University in the Field of Natural Resources.

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CHAPTER 1

Estimating Black Bear Population Density In A Recently Expanded Region Of The Southern Black Bear Range of New York

Introduction

Estimating population density and understanding the spatial processes that shape those patterns are important for many questions related to ecology, conservation, and management of animal populations. These estimates are particularly useful for populations expanding in range because they can be used to anticipate future changes in the population [1]. Range expansions can occur when individuals disperse due to climactic or environmental changes [2–5], as a result of habitat fragmentation that can force individuals to travel farther to obtain resources, or when interspecific and intraspecific pressures increase on resources such as food and space [6–8]. The pressure to disperse combined with characteristics of the landscape into which the individuals expand, such as topography or barriers to movement, can produce complex demographic and population genetic patterns [1,8–10]. Reduced habitat availability beyond the historic geographic range can limit effective dispersal, leading to low population densities at and beyond range margins [2,11–13]. In recently expanded portions of their ranges, individuals may utilize different resources and exhibit new patterns of space usage [14]. Understanding these patterns and making predictions about range establishment can aid in the management of wildlife populations [9,15–19].

Managing populations and anticipating changes in their distribution require spatial estimates of population size and density. Recently developed spatial capture-recapture (SCR) approaches provide such spatial estimates through the use of auxiliary information about the locations of individuals in the population [20,21]. SCR models utilize the locations of capture and recapture events of individuals to estimate capture probabilities that are individual-specific, as functions of the distance between each individual's estimated activity center (e.g., home range) and the sampling array [20,22,23]. In this way, SCR models provide estimates of population density that can be mapped as a distribution across the landscape. Population density can then be related to ecologically relevant covariates such as habitat and landcover types, which have been found to be important drivers of population expansion of many species [13,18].

Assessing the genetic patterns at range margins can also provide insight into the demographic and evolutionary forces that shape and may continue to influence population dynamics. For example, genetic patterns may reveal and/or provide support for demographic patterns [1] including migration and population connectivity, re-colonization with founder effects [24], or inbreeding and genetic drift in small [25], isolated populations [26,27]. As a result, the demographic and evolutionary inferences from genetic sampling can play an important role in designing management strategies, and even helping to identify management objectives. An increasing number of SCR studies employ non-invasive genetic methods to identify individuals and examine population genetics [28,29]. Individuals passively deposit genetic material in sloughed skin, fecal, feather, and hair samples at sampling sites so that it is unnecessary to physically capture and handle individuals to apply unique markers for subsequent identification [30–32]. This is a methodological advantage when studying low-density populations or species that are elusive or difficult to handle [33–35]. Furthermore, non-invasive genetic methods do not risk tag-loss and may yield larger sample sizes [29,36–39].

In this study, we investigated the spatial patterns of population density and genetic diversity in a black bear population in southern New York. Since the early 1990s, black bear populations in New York have undergone range expansions, especially in the south [40]. As individuals disperse and migrants arrive from neighboring states, such as from north-central Pennsylvania [40,41], expansion from historical ranges northward into central New York has merged the southern black bear populations into a single Southern Black Bear Range. Black bears easily adapt to new habitats, including human-dominated landscapes [42,43], resulting in a range expansion that encroaches into areas of agriculture and densely populated urban areas [40,44]. This population growth and range expansion has also led to increases in the frequency and intensity of human-bear interactions [41,45–48].

To manage black bears as they expand into central New York, it is necessary to estimate population size and understand the spatial, demographic, and genetic patterns that characterize the population [1]. Estimating black bear population size is especially important because they are a long-lived species with relatively low annual reproductive rates, making them susceptible to over-harvesting [49,50]. However, current methods for monitoring bear populations in New York use indirect indices derived from data including harvest records, non-hunt mortalities, and/or nuisance complaints, and therefore are not precise and may not accurately track true changes in population abundance [40,51,52]. Furthermore, these methods do not provide the spatial estimates that are necessary for understanding the spatial patterns of populations [53,54]. We conducted a non-invasive, genetic, spatial capture-recapture study in a region of a recently expanded black bear range in southern New York to 1) estimate spatially-referenced population size and density, 2) test for spatial patterns in population density related to habitat and landcover to understand patterns of range expansion, and 3) evaluate patterns of genetic diversity of the black bear population.

Study Area

The study area encompassed approximately 2,624 km^2 in the Southern Black Bear Range in New York, the primary region of black bear range expansion in the state (Figure 1.1) [40]. The study area included portions of both the presumed southern historical range and the recently expanded area of the range [40]. The study area was composed of 30% deciduous forest (primarily *Quercus alba, Q. palustris, Q. rubra*,

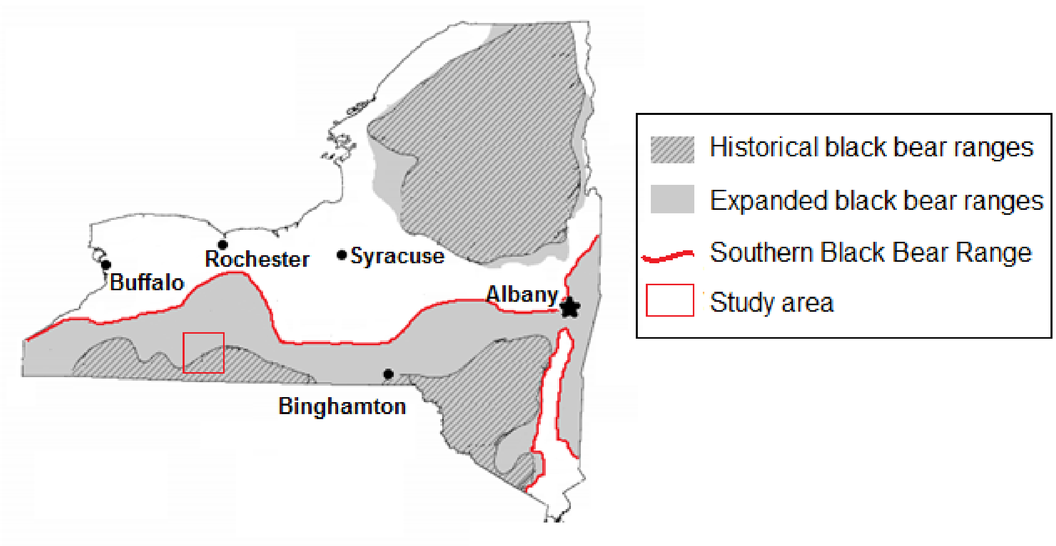

Figure 1.1 .Black bear range expansion in New York has been primarily in the Southern Black Bear Range, northwards towards metropolitan areas including the cities of Buffalo, Rochester, Syracuse, Binghamton, and the capital, Albany. The current expanded black bear range is estimated based on the presence of females with cubs.

Carya glabra, C. ovata, *Acer saccharum*, *Fagus grandifolia*, and *Betula alleghaniensis*) , 13% mixed and evergreen forest (*Pinus strobus, P. resinosa*, *Picea abies, and Tsuga canadensis*), 4% shrub and grasslands, 50% agriculture (pasture, hay, and corn, oats and wheat), and 2% developed areas [55] (Figure 1.2). As latitude in the study area increased, i.e. from the historical (southern) to the expanded (northern) portions of the black bear range, forest landcover decreased from an average of 52 ± 22% (1 SD) to 42 ± 21% (Figure 1.3d); shrub and grassland increased from an average of 5 ± 5% to 10 ± 3% (Figure 1.3b), and agriculture decreased from an average of 39 ± 22% to 37 ± 21% (Figure 1.3c). The study area included an extensive network of primary roads with a road density that averaged 1.5 km/km^2 (range: 0.2 – 8.1 km/km^2), and which increased from 0.8 ± 0.3 km/km^2 at the southern extent of the study area to 1.0 ± 0.3 km/km^2 at the northern extent (Figure 1.3a). Average elevation in the study area is 532 ± 93 m (range: 198 – 733 m). The study area receives an average of 64 cm of precipitation in the summer (May-August), with temperature ranging from 4$^{\circ C}$ – 27$^{\circ C}$ (20 year min and max averages in Alfred NY [56]).

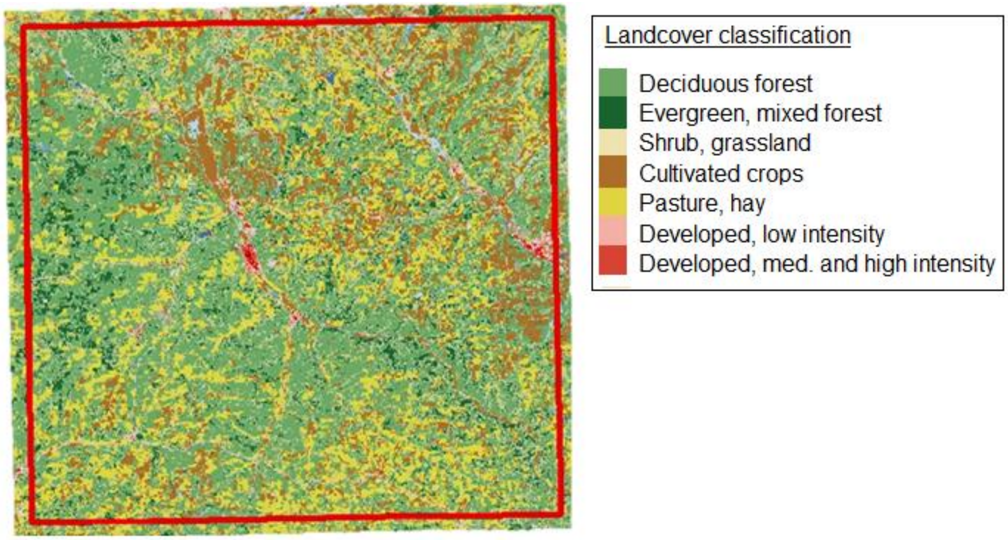

Figure 1.2. Landcover classification in the 2,624 km^2 study area of the Southern Black Bear Range in New York. The study area included deciduous, evergreen and mixed forests, shrub and grasslands, agriculture, which was composed of pasture, hay and cultivated crops, and developed areas of varying intensity.

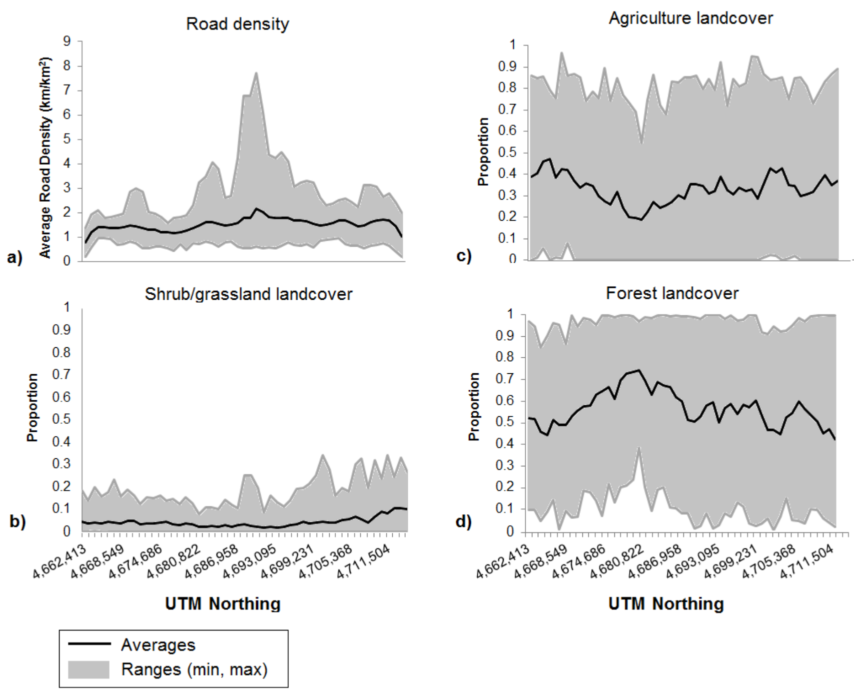

Figure 1.3. Change in proportion of road density (a), shrub and grassland (b), agriculture (c), and forest (d) landcover types with increasing latitude in the black bear study area in southern New York.

Methods

Data Collection

We set barbed-wire hair snares across the study area from June 7 – August 20, 2011 and from June 4 – August 10, 2012. In each ~10 week sampling season, we determined the placement of hair snares by overlaying a grid of 6.4 x 6.4 km cells over the study area, based on average female home range estimates in northeastern Pennsylvania [57]. This resulted in 64 cells of potential non-overlapping home ranges. We aimed to place four hair snares per cell in alternating cells for half of the sampling seasons (5 weeks). We then moved the snares to the previously un-sampled cells for the remainder of the seasons (5 weeks). We checked hair snare sites weekly. This site-relocation approach is a common method to increase sampling in large study areas, increase detection probability, and avoid snare habituation and behavioral responses [58]. Hair snare sites included both state-owned lands and privately-owned lands.

We constructed barbed wire hair-snares according to the methodology detailed by Woods et al. [59]; in 2011, one strand of wire, approximately 30 m longwas wrapped in a circular fashion around 5-6 trees, 50 cm above level ground; in 2012, two strands were used in each snare, set at approximately 30 cm and 60 cm above level ground [19]. We baited hair snare sites with rotten meat on the ground and pastry products strung approximately 2 m above ground between two trees; fish fertilizer, liquid smoke, skunk paste, and anise and strawberry extracts were sprayed on surrounding vegetation and hanging scent rags. Study sites were re-baited and re-scented weekly.

In 2011, we surveyed 219 barbed wire hair-snares across the study area (Figure 1.4a). We surveyed a total of 101 and 122 snares during the first and second halves of the sampling season, respectively, with four snares surveyed continuously throughout the season. In 2012, we surveyed 199 barbed wire hair-snares; we surveyed a total of 99 and 119 snares during the first and second halves of the sampling season, respectively, with 19 snares surveyed continuously throughout the season (Figure 1.4b).

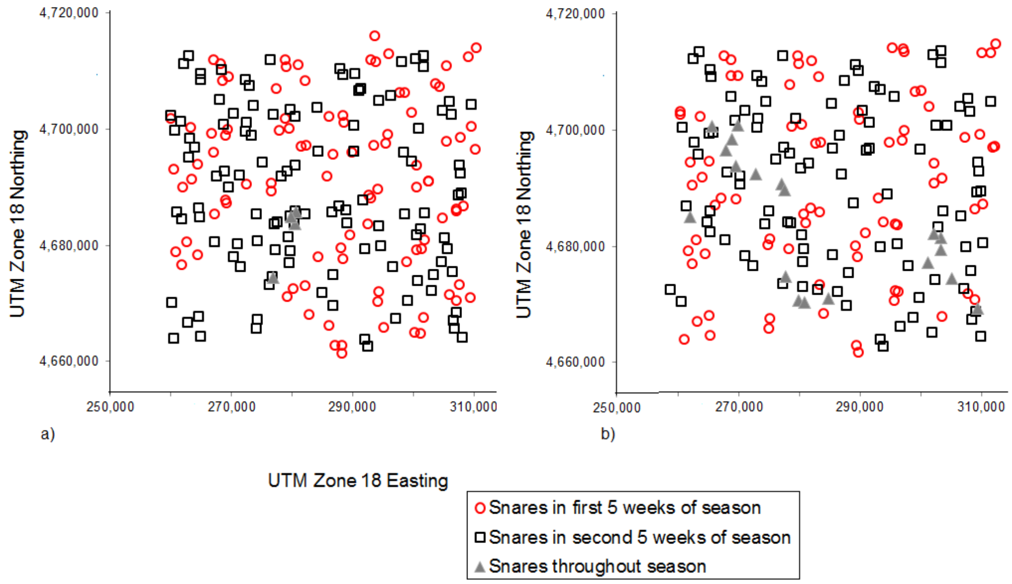

Figure 1.4. Locations of barbed wire hair snares in a black bear study in southern New York in 2011 (a) and 2012 (b).

We collected hair samples from wire barbs using forceps and stored samples in labeled paper coin envelopes. For each sample, we recorded the date, snare location, approximate number of hairs with follicles, and location on the barbed wire. We removed and did not collect hairs from non-target animals. After sample collection, barbs and forceps were sterilized by flame to remove residual hairs and minimize chances of contamination. We stored samples at room temperature away from direct sunlight in larger paper envelopes with silica desiccant to prevent DNA contamination and degradation.

DNA Analysis

We extracted DNA from hair follicles with Qiagen® DNeasy Blood and Tissue Kits, using the manufacturers' hair-specific protocol. We pooled samples if they were from the same sampling occasion and snare, contained <5 guard or 10 underfur follicles, and were collected from within 2 barbs of each other (i.e., within 25 cm).

Otherwise, we did not extract DNA from samples with <5 guard or 10 underfur follicles. We eluted DNA twice with 100 uL of Buffer AE each, with aliquots archived at -20$^{\circ C}$ to minimize freeze-thaw degradation. Given the low amounts of DNA in hair follicles, the quantity and quality of extracted DNA was assessed from subsequent polymerase chain reaction (PCR) results.

We amplified with PCR methods a suite of eight genetic markers: one sexing marker and seven nuclear microsatellites (sexing: AMEL; microsatellites: G10L, G1D, G1A, G10B, G10H, G10O and Mu59) [60–63]. For the AMEL sexing marker, we used 10uL reactions with 1uL DNA template, 4 pmol each of forward and reverse primer, 0.2 mg/ml BSA, 1x Invitrogen® buffer, 1.5mM $MgCl_2$, 0.2 mM each of dNTPs, and 0.9 units of recombinant *Taq* polymerase (Invitrogen®). We combined fluorescently labeled primers for the seven microsatellites into three multiplexes (M1: G1D and G10L, M2: G1A and G10B, and M3: G10H, G10O, and Mu59). For M1 and M2, we used 10 μL reactions with 2μL DNA template, 4 pmol each of forward and reverse primer, and 5 μL of Qiagen® Multiplex Master Mix. For M3, we used 12 μL reactions with 2 μL DNA template, 2.5 pmol of each primer, and 6.25 μL of Qiagen® Multiplex Master Mix. The thermal profile for AMEL amplification was 97°C for 3 minutes, followed by 36 cycles of 94°C for 1 minute, 67°C for 1 minute, and 72°C for 1 minute, and finished with 72°C for 10 minutes. All microsatellite PCRs used a hot start at 95ºC for 15 minutes and finished with a final extension at 60°C for 30 minutes followed by a hold at 15°C until removed from the thermal cycler. The cycling profile for M1 included 94°C for 30 seconds, touchdown annealing of 90 seconds starting at 62.2°C that decreased by 0.2 °C per cycle for 12 cycles, followed by 27 cycles with 60°C annealing for 90 seconds, and extension at 72°C for 1 minute. Parameters were the same for M2 except the touchdown annealing started at 65°C for 1 minute, decreased by 1°C for each of 8 cycles, with the final 27 cycles annealing at 58°C for 90 seconds. For M3 there was no touchdown, annealing was at 56°C for 90 seconds, and a total of 45 cycles was applied.

Negative controls were included in each round of PCR to detect reagent contamination, and PCR results were discarded if amplicons were detected in the negative controls.

The AMEL sexing marker is on the homologous X and Y sex chromosomes in mammals. In bears, the AMEL primers amplify fragments of different sizes from the two chromosomes, ~244 base pairs (bp) from the X chromosome and ~190 bp from the Y chromosome [62]. Amplicons were electrophoresed for 1 hour at 200 V in 1.5% agarose and visualized using ethidium bromide. Visual discrimination between one band at ~244 bp or two bands at ~190 bp and ~244 bp distinguished between females and males, respectively [62,64]. If no bands were present, we scored the sample as unknown sex. We replicated samples for which we failed to initially assign sex up to two additional times. We scored AMEL genotypes as missing if they differed among replicates.

We mixed microsatellite PCR products with 500-LIZ size standard and HiDi formamide (Applied Biosystems ®) and sent samples for fragment analysis at Cornell Life Sciences Core Laboratories Center on an ABI 3730x1 DNA analyzer. We scored and assigned alleles using Genemapper v4.1 (Applied Biosystems ®) and visual verification. We replicated samples that yielded weak or no amplification. To correct genotyping errors and estimate genotyping error rates, we replicated microsatellite PCR and genotyping for a randomly selected portion of the remaining samples. When replicated microsatellite genotypes differed, we further replicated the sample a maximum of four times to determine a consensus genotype based on reconsideration of electropherogram peak patterns and heights. At this stage alleles were removed as artifacts (i.e., false alleles) if they were rarely observed across samples and had a fragment size distinct from the overall distribution of allele sizes. If we removed a false allele from a heterozygous genotype, we scored the genotype as homozygous for the remaining allele; if we removed a false allele from a homozygous genotype or two false alleles from a heterozygous genotype, then we scored the genotype as missing at that locus. If an unambiguous consensus genotype was not determined after a maximum of five total PCR attempts, we scored the locus as missing. We considered samples to be contaminated and removed them from subsequent analysis if multiple replicate genotypes at a locus had ≥3 alleles. We also removed samples with ≥3 missing microsatellite loci from the dataset due to inconclusiveness in assigning genotypes to a new capture or recapture.

Next, we evaluated the differences between distinct genotypes. Distinct genotypes were multi-locus genotypes that differed at ≥1 locus. We used the set of distinct genotypes across all samples to estimate allele frequencies, and from these calculated the expected distributions of single-locus mismatches (MM) in an eight-marker genotype drawn from a randomly mating population (MMDIST, [65]). We used this expected distribution to evaluate the probability that pairs of genotypes would have zero, one, or two differences, i.e. mismatches, among the eight genetic markers by chance. As the number of mismatches between genotypes increased, the probability of mismatch due to genotyping error decreased; conversely, as the number of mismatches decreased, the probability of mismatch due to genotyping error increased. As a result, if 1-2MMs within pairs of genotypes were highly improbable for the set of microsatellite markers in this population, then such genotype in our dataset most likely differed due to genotyping error (i.e., false negatives, Type II error) and in reality were recaptures of the same genotype. We re-examined pairs of genotypes with up to 2MMs [38,66] in two stages. In the first stage, we used majority-rule to collapse differing genotypes to a single consensus genotype with recaptures. We did not collapse pairs with 1-2MMs if each of the mismatching genotypes were corroborated by either ≥3 genotyping replicates, or by >2 samples with the same entire genotype [38] and ≥1 corroborating replicate. When majority-rule could not be invoked across genotypes and MMs occurred between homozygous and heterozygous genotypes with a common allele, we chose the heterozygous genotype as the consensus. Spatial proximity of the locations at which the genotypes were detected was not used in determining if mismatching genotypes should be collapsed.

In the second stage of MM analysis, we used program SHAZA v.2.00 [67] to further collapse MMs among the new set of distinct genotypes. Using the allele frequencies of the input genotypes and conditional on the estimated genotyping error rate, we evaluated the likelihood that genotypes were truly unique and that observed pairs of mismatches were real differences (true negatives) under the null hypothesis (H_o) against the likelihood of the alternate hypothesis (H_a) that observed mismatches within pairs of genotypes were caused by genotyping error (false negatives, Type II error). Likelihood ratios for pairs of genotypes were calculated and compared to a threshold value. The threshold value was determined by SHAZA based on ranking the likelihood ratios of genotype pairs that were simulated with the converged estimator of the false recapture rate that minimized the standard error in estimated number of recaptures in the dataset (see [67] for more details). If a pair of mismatching genotypes had a likelihood ratio greater than the threshold value, they were considered to be false negatives and collapsed to a consensus genotype using the same rules described in the first stage of MM analysis. SHAZA runs used default parameters except for genotyping error rate.

We estimated genotyping error rates for each microsatellite locus based on the consensus genotypes of samples that were randomly chosen for replication. Genotyping error on a per-genotype basis for a sample was considered to be at least one mismatch between the consensus genotype and the genotypes from either the first PCR or the first two subsequent, successful replications [68]. Given the overall few replicates per sample, we did not distinguish between false alleles and allelic dropout. We calculated error rate for each microsatellite locus as a ratio of the number of samples with at least one mismatching replicate against the total number of replicated samples.

Genetic diversity was measured from the final set of distinct genotypes in terms of allelic richness, observed and expected population heterozygosity (H_o and H_e) and probabilities of identity (P_{ID} and P_{ID_SIB}) using GenAlEx v. 6.5 [69] and FSTAT v. 2.9.3.2 [70]. P_{ID} is the probability that two randomly chosen individuals from a population will have the same genotype, given estimated allele frequencies at the genetic marker set; P_{ID_SIB} is the probability of P_{ID} among full siblings [71,72]. Furthermore, P_{ID} and P_{ID_SIB} reflect the power of the microsatellite marker set to distinguish between individuals in the population. P_{ID_SIB} is a more conservative measure than P_{ID}. Observed genotype frequencies were tested against Hardy-Weinberg expectations (HWE) using exact tests implemented in FSTAT v. 2.9.3.2 [70].

Spatial Capture-Recapture Model Formulation

We constructed a spatial capture-recapture (SCR) model based on the hierarchical formulation of Royle and Young [20]. SCR data collected from hair snares assumed an individual could be detected only once per snare location per sampling session, but at any number of snare locations [23,73]. The detection history for an individual *i* at a particular location *j* at a specific sampling occasion *k,* was denoted as y_{ijk}. If an individual was detected, then y_{ijk} =1 else y_{ijk} =0. Whether or not an individual was detected follows a Bernoulli distribution with probability p_{ijk} , so that:

$$\begin{aligned} \text{if detected,} \qquad & \Pr\left(y_{ijk}=1\right)=p_{ijk} \\ \text{if not detected,} \qquad & \Pr\left(y_{ijk}=0\right)=1-p_{ijk} \end{aligned}$$

We modeled factors that might influence detection probability on the parameter p_{ijk}. An individual’s snare-specific detection probability was a function of a baseline detection rate, λ_0, when the snare x_j is located exactly at an individual’s ‘activity center’ s_i, such that

$$\Pr(y_{ijk} = 1) = p_{ijk} = e^{-\lambda_0 G_{ij} m_{jk}} \quad (1)$$

To reflect that an individual was less likely to visit snare locations farther away from its activity center, we assumed detection probability decreased following a half normal function,

$$G_{ij} = e^{\frac{\left\|s_i - x_j\right\|^2}{2\sigma^2}} = e^{\frac{-d_{ij}^2}{2\sigma^2}} \quad (2)$$

based on the Euclidean distance $\left\|s_i - x_j\right\|^2$ between activity center s_i and location x_j, and where σ is a spatial scale parameter determining the rate of decrease in detection probability. Locations of activity centers were unknown, so they were treated as latent variables/random effects and assumed to be independently and identically distributed [20,23,74]. The binary variable, m_{jk}, accounted for snare relocation. A location *j* was only considered during sampling occasion *k* when a snare was in operation there, i.e., m_{jk} =1, and m_{jk} =0 when the snare was removed from site *j.* Thus, detection probability at a location was constrained to 0 when there was no snare.

We included five snare-specific habitat covariates ($\beta_{8\text{-}12}$) in the observation model to account for potential effects of different landscapes and habitat types on detection probability. The choice of covariates was motivated by the presumed historical pattern of range expansion from traditional forested areas to anthropogenically-altered habitats and landcover types [18,75]. We included percentages of forest (β_8), agriculture and pasture (β_9), and shrub and grassland (β_{10}). All forests (conifer, deciduous, and mixed coniferous-deciduous) were grouped as a single landcover type since different forests types in temperate climates primarily serve to provide bears with cover and shelter in the summer [76]. Agriculture and pasture were grouped into a second landcover type to represent a dominant landcover in the area that bears are beginning to utilize, and shrub and grasslands were grouped into a third landcover type as they provide important food resources during summer [18,47,77]. Landcover data were obtained from the 2006 National Land Cover Dataset (30m resolution, [55]). We included a covariate for primary road density (β_{11}) to model urban development, which bears have been found to avoid in second and third-order resource selection [46,47,78–80]. We included a covariate (β_{12}) for Topographic Positioning Index (TPI), a standardized elevation calculated as the difference between the local elevation and the average in a 30m radius neighborhood, divided by the neighborhood standard deviation. To calculate TPI we used a digital-elevation model of the study area in 1 arc-second resolution [81] and the Land Facet Corridor Analysis package [82] in ArcGIS [83]. Values of TPI indicate the number of standard deviations above (positive TPI) or below (negative TPI) the neighborhood average; a region with TPI=0 indicates that its elevation is the average of the neighborhood. Studies have identified positive relationships between elevation and population densities in black bears [19,46,84], and bears may also favor mountainous, rugged areas and slopes [18,85], such that bear density and detection probability may be greater in areas with TPI>0. For each covariate, we calculated the means for raster pixels of 1 km^2 each, i.e., within ranges of estimated daily movement for males and females in the study area (M. Adams, unpublished data), because detection of a bear at a snare location depends on both immediate spatial proximity as well as patterns of third-order resource selection [46,77,78].

We also included individual-specific covariates on detection probability to account for effects of sex (δ) and behavioral response potentially due to bait and scent lures (α) [33,86–88]. To account for behavioral responses, we added a binary covariate IND where IND_{ik}=1 when individual i was detected previous to occasion k, and 0 otherwise. To account for sex-based differences in detection, a binary indicator Sex_i =1 was added when individual i was male, which required the model to estimate the unknown sex ratio in the population given the distribution

$$Sex_i \sim Bernoulli(\tau)$$

such that

$$\log(\lambda_{0,ijk}) = \lambda_0 + \alpha IND_{ik} + \delta Sex_i + \ \beta_8 Forest_j \\ + \ \beta_9 Agriculture_j \ + \ \beta_{10} ShrubGrass_j \\ + \ \beta_{11} RoadDensity_j + \ \beta_{12} TPI_j \tag{3}$$

To model the distribution of individuals over the landscape (i.e., the process part of the hierarchical model), we used an inhomogeneous Poisson point process [89]. This allowed the distribution of individuals to vary spatially according to an intensity function with covariates. We included seven continuous covariates (β_1 – β_7) at 1 km resolution to model the density of black bears. To evaluate the presence of a north-to-south gradient in population density in the study area, we included a latitude covariate (β_1). To detect patterns in population density due to landcover types, we included percent forest as linear (β_2) and quadratic (β_3) covariates to detect changes in population density as a function of a preferred bear habitat type, and percent agriculture (β_4), and shrub/grassland (β_5). To detect patterns in population density associated with roads, we included a covariate for road density (β_6). Lastly, we included a covariate for TPI (β_7) to detect patterns in bear density associated with elevation. In unison, these covariates were modelled on the intensity of density in a particular landscape pixel, μ_j, as:

$$\mu_j = \ area_j * e^{\wedge} \\ ((\beta_0 + \beta_1 latitude_j + \beta_2 Forest_j + \beta_3 Forest_j^2 + \beta_4 Agriculture_j \\ + \beta_5 ShrubGrass_j + \beta_6 RoadDensty_j + \beta_7 TPI_j) \tag{4}$$

where β_0 is the intercept for the intensity function and $area_j$ is the area of pixel j (i.e.,1 km^2). As a result, the probability of an individual being in particular pixel j is the intensity in that pixel divided by the (expected) population size (E[N]) [89]:

$$probability_j = \frac{\mu_j}{E[N]} \tag{5}$$

The expected number of individuals in the population, E[N], is $E[N] = M\psi$, where M is a user-specified upper bound of the possible size of N and ψ is the probability that an individual in M is a member of the population N (inclusion probability, part of the data augmentation approach often used in binomial point processes, see [90]).

Formal analysis of the hierarchical model provided estimates of the location and number of activity centers in the study area [20,22], i.e., population size. A technique known as data augmentation (DA), mentioned briefly in the formulation of the process model, was used to account for the unknown population size N [90,91]. Given n number of detected individuals, DA involves appending *(M-n)* number of detection histories of only zeroes to the data set that represent real, undetected individuals (sampling zeroes) and imaginary individuals (structural zeroes). The size of M must be large enough to avoid truncating the posterior distribution of N but also should not be so large as to make the MCMC algorithm inefficient. We selected an augmented dataset size of M=500 after initial model results showed that M=500 did not truncate the posterior distribution of N. We conducted Bayesian model selection using an indicator variable approach for the habitat covariates [92–94], where each habitat covariate ($\beta_{1\text{-}12}$) in the model was multiplied by a binary indicator variable ($w_{1\text{-}12}$). For the quadratic forest parameter, we included the indicator variable for the linear forest parameter so that the quadratic forest parameter was included in the model only if the linear parameter was included. As a result, each unique combinatorial sequence (vector) of the indicator variables represented a different model. There were 2^{12} models in the model set, with prior probabilities of either $1/2^{12}$ or $2/2^{12}$ depending if the quadratic forest parameter was included (w_2=1, w_3=1). Posterior model weights were calculated by tabulating the model frequencies in the MCMC histories. We examined sensitivity of the posteriors of the habitat covariates to their prior distributions by running the models once with prior distributions for the habitat covariates following Uniform(-10,10) and again following Normal(μ=0, τ =0.1).

We analyzed the datasets from 2011 and 2012 separately to compare population estimates between years. The models were evaluated using Markov chain Monte Carlo (MCMC) algorithms with JAGS via Program R [90,95,96]. We used a Bayesian analysis in order to include the missing sex information of some individuals, which current maximum likelihood approaches do not currently accommodate [97]. To improve the mixing of chains, the habitat and road covariates were standardized. TPI was already standardized and therefore was not standardized again. Initial start values for the chains were informed by telemetry data (M. Adams, unpublished data) and the results from a black bear SCR study at Fort Drum Military Installation in northern New York [23]. Models were run for 15,000 iterations with a burn in of 2,000, with three chains each and a thin rate of one. The chains were assessed for convergence both visually with posterior distributions and the Gelman-Rubin statistic $\hat{R}$=1.1 [98].

Results

Non-invasive genetic sampling

We collected 500 hair samples from 44% (96/219) of the snares in 2011. Snare success increased from 34% to 52% over the two halves of season. Average distance between neighboring hair snare sites was 2.0 km (range: 0.02 – 5.4 km). We extracted DNA from 90% (452/500) of the collected samples in 2011 and pooled 58 samples after extraction due to insufficient DNA in some samples. We subsequently removed 13 samples due to ≥3 missing loci, with no samples removed due to contamination. This resulted in multi-locus genotypes for 327 samples in 2011. A total of 52 single-locus genotypes were missing in the final dataset (2.3%).

We collected 1,985 hair samples from 63% (126/199) of the snares in 2012. Snare success decreased from 73% to 57% over the two halves of the season. Average distance between neighboring hair snare sites was 2.0 km (range: 0.3 – 5.7 km). We extracted DNA from 56% (1,107/1,985) of the collected samples in 2012 and pooled 277 samples prior to extraction due to insufficient number of follicles in some samples. We subsequently removed two samples due to ≥3 missing loci and removed 23 samples due to apparent contamination (≥3 alleles at one or more loci). This resulted in multi-locus genotypes for 826 samples in 2012. A total of 44 single-locus genotypes were missing in the final dataset (0.76%).

We replicated an average of 23% of samples at least once across the seven microsatellite markers (range: 11 – 40%) in 2011. Genotyping error rates in 2011 averaged 11.0% among loci (range: 5.0 – 18.8%, Table 1.1a). The expected distribution of pairwise mismatches between genotypes in a population of randomly mating individuals, based on allele frequencies observed in 2011, suggested a $4.2*10^{-5}$ % probability of 1MM and $2.0*10^{-3}$ % probability of 2MM in pairwise genotype comparisons. In the first stage of MM analysis in 2011, we examined an initial 109 pairs of 1-2MMs, collapsing 92 pairs and retaining 8 pairs of 1MMs and 9 pairs of 2MMs. This resulted in 173 distinct genotypes that we further analyzed in the second stage of MM analysis in SHAZA, assuming

Table 1.1. Genotype replication and genotyping error rates for each of seven microsatellite loci in a study of black bears in southern New York in 2011(a) and 2012 (b).'Total samples' refers to the number of pooled and extracted hair samples that were analyzed; 'Replication rate' refers to the percent of extracted samples that were replicated for quantifying genotyping error rates. Error rates do not distinguish between false alleles and allelic dropout. Mean values refer to averages across the seven loci.

a)

	2011							
	G1D	G10L	G1A	G10B	G10H	G10O	Mu59	Mean
Total samples	320	313	322	316	320	317	320	N/A
Replication rate (%)	33.9	32.7	40.4	21.0	10.8	13.41	7.8	22.9
Error rate (%)	7.4	5.0	8.8	11.3	11.6	18.8	14.0	11.0

b)

	2012							
	G1D	G10L	G1A	G10B	G10H	G10O	Mu59	Mean
Total samples	851	851	851	851	851	851	851	N/A
Replication rate (%)	62.6	67.4	52.5	39.4	44.9	62.3	59.4	55.6
Error rate (%)	5.8	5.7	1.9	3.4	2.8	4.4	3.0	3.8

12% genotyping error. We collapsed 26 genotypes into 12 consensus genotypes, resulting in 159 distinct genotypes.

We replicated an average of 56% of samples at least once across the seven microsatellite markers (range: 39 – 67%) in 2012. Genotyping error rates in 2012 averaged 3.8% among loci (range: 1.9 – 5.8%, Table 1.1b). The expected distribution of pairwise mismatches between genotypes in 2012 suggested a $8.0*10^{-5}$ % probability of 1MM and $3.5*10^{-3}$ % probability of 2MM in pairwise genotype comparisons. In the first stage of MM analysis in 2012, we examined 220 pairs of 1-2MMs, collapsing 182 pairs and retaining 19 pairs each of 1MMs and 2MMs. This resulted in 187 distinct genotypes that we analyzed in the second stage of MM analysis in SHAZA, assuming 6% genotyping error. We collapsed 32 genotypes into 14 consensus genotypes, resulting in 169 distinct genotypes.

We identified 159 bears (30 M, 28 F, 101 unknown) in 2011 from 245 detections with 327 hair samples (i.e., combinations of unique genotype with snare and sampling occasion). We identified 169 bears (31M, 31F, 107 unknown) in 2012 from 467 detections with 826 hair samples. Probabilities of identity (P_{ID}) were 4.02×10^{-9} and 1.33×10^{-8} in 2011 and 2012, respectively; probabilities of identity for siblings (P_{ID_SIB}) were 1.05×10^{-3} and 1.04×10^{-3} in 2011 and 2012, respectively (Table 1.2). Estimates of the probabilities of identity provided confidence that the genetic marker set was sufficiently powerful to distinguish between individuals.

Table 1.2. Measures of genetic diversity for the microsatellite loci used for genotyping and identifying individuals from black bear hair samples from the study area in southern New York in 2011 and 2012. Allelic richness accounts for sample size across loci; H_o = observed heterozygosity; H_e = expected heterozygosity; P_{ID} = probability of identity; P_{ID_SIB} = probability of full sibs, F_{IS}= F statistic measuring inbreeding with multiple tests adjusted, α=0.00714 level. Overall values for P_{ID} and P_{ID_SIB} are products across the markers, and are Fisher's combined p-values for F_{IS}. A "*" indicates significant deviation from Hardy Weinberg expectations after Bonferroni correction.

	Allelic Richness		Ho		He		P_{ID}		P_{ID_SIB}		F_{IS}	
Locus	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**
G1D	10.00	10.00	0.66	0.63	0.73	0.66	0.10	0.14	0.41	0.45	0.099	0.059
G10L	16.00	13.98	0.84	0.84	0.90	0.90	0.02	0.02	0.31	0.31	0.062	0.060
G1A	10.85	9.91	0.80	0.80	0.81	0.79	0.07	0.07	0.36	0.37	0.008	-0.006
G10B	6.00	6.00	0.63	0.50	0.65	0.61	0.17	0.20	0.47	0.49	0.040	0.180*
G10H	18.90	17.95	0.80	0.82	0.83	0.82	0.04	0.05	0.35	0.35	0.038	0.007
G10O	16.86	17.87	0.77	0.80	0.85	0.82	0.04	0.05	0.34	0.36	0.094	0.026
Mu59	12.96	13.00	0.72	0.74	0.73	0.72	0.10	0.12	0.41	0.42	0.014	-0.035
Mean	13.08	12.67	0.74	0.73	0.74	0.71						
Overall							4.02^{-09}	1.33^{-08}	1.05^{-03}	1.04^{-03}	0.052*	0.038

Allelic richness at microsatellites averaged 13.1 (range: 10.0 – 18.9) in 2011 and 12.7 (range: 10.0 – 18.0) in 2012, and was not significantly different between years (permutation test with 10,000 iterations, two-sided p = 0.51) (Table 1.2). Expected heterozygosity of the population was H_e=0.74 in 2011. All microsatellite loci in 2011 trended toward heterozygote deficiencies but none were significant after Bonferroni correction (α = 0.05, adjusted to α = 0.00714 for multiple comparisons). Taken together, the 2011 microsatellites had an among-locus average F_{IS}=0.052, a significant deviation from HWE (Fisher's combined p=0.0071). Expected heterozygosity of the population was H_e=0.71 in 2012. The G10B locus exhibited a significant heterozygote deficiency (α = 0.05, adjusted to α = 0.00714 for multiple comparisons) in 2012, but the overall estimated F_{IS}=0.038 did not significantly deviate from HWE. Differences in F_{IS} between 2011 and 2012 were not significant (permutation test with 10,000 iterations, two-sided p-value = 1).

SCR Analysis

The 159 individuals detected in 2011 had an average of 1.5 non-spatial detections (Table 1.3) at 1.3 different hair snares (spatial detections, Table 1.4). One individual was detected a maximum of eight times, at five different hair snares. The average number of detections per snare increased slightly from 0.86 to 1.29 across the halves of the season in 2011 (Figure 1.5). In comparison, the 169 individuals detected in 2012 had an average of 2.8 non-spatial detections (Table 1.3) at 1.9 different hair snares (spatial detections, Table 1.4). One individual was detected a maximum of 14 times, and another detected at a maximum of 12 hair snares. The average number of detections per snare decreased from 2.8 to 1.6 across the halves of the season in 2012 (Figure 1.6).

Table 1.3. Number of individual black bears that were detected 1 – 14 times (non-spatial detections) in 2011 and 2012 in the study area in southern New York.

	Number of non-spatial detections														
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean
2011	117	21	11	3	3	3	0	1	0	0	0	0	0	0	1.5
2012	83	25	17	11	8	11	5	1	2	1	1	2	1	1	2.8

Table 1.4. Number of individual black bears that were detected at 1 – 12 different hair snares (spatial detections) in 2011 and 2012 in the study area in southern New York.

	Number of spatial detections												
Year	1	2	3	4	5	6	7	8	9	10	11	12	Mean
2011	127	23	4	4	1	0	0	0	0	0	0	0	1.3
2012	101	34	14	8	8	2	0	1	0	0	0	1	1.9

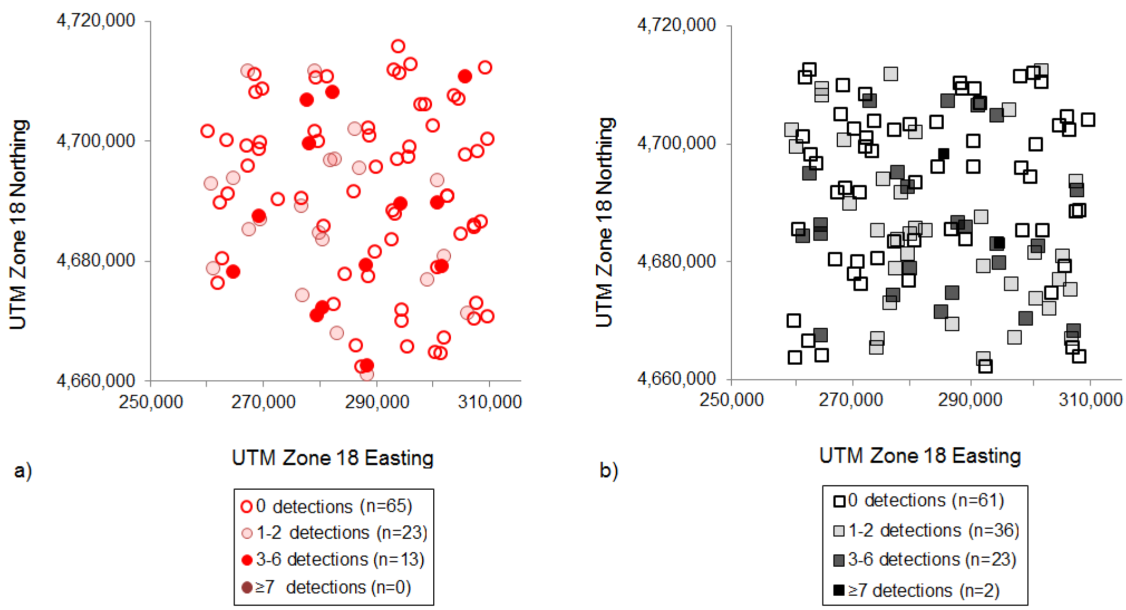

Figure 1.5. Locations of barbed wire hair snares in a black bear study in southern New York in 2011, showing the number of detections per snare during the 5 five weeks (a) and second 5 weeks (b) of the sampling season.

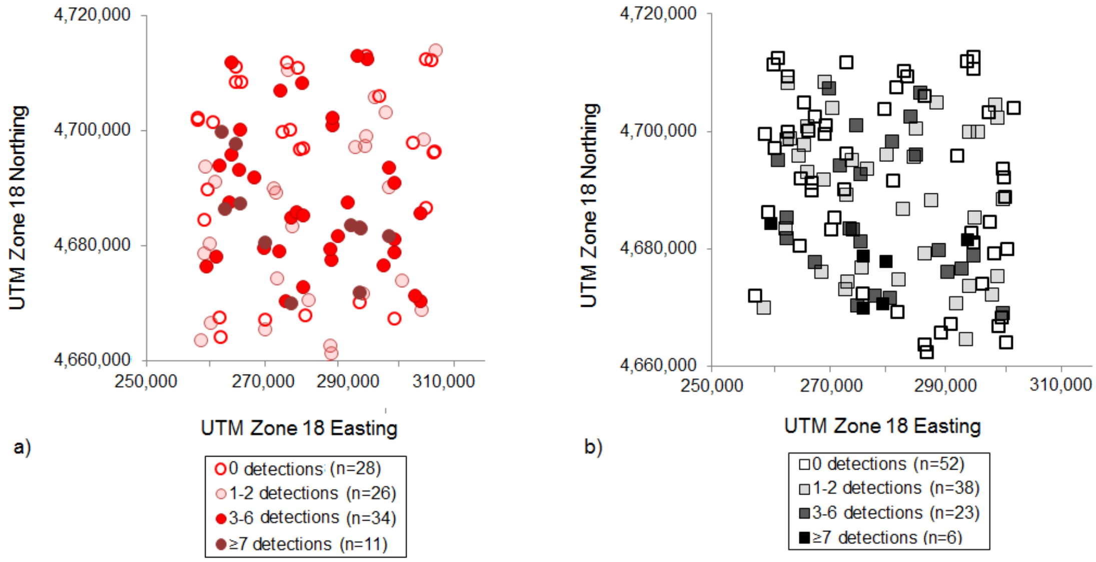

Figure 1.6. Locations of barbed wire hair snares in a black bear study in southern New York in 2012, showing the number of detections per snare during the first 5 weeks (a) and second 5 weeks (b) of the sampling season.

When we used uniform prior distributions for the habitat covariates in the SCR model in 2012, the Markov chains mixed poorly. When posterior distributions were uni-modal, they were similar to when normal priors were used, so we focus on the results from models that used normal priors for the habitat covariates. The posterior mean population density of black bears was 9.1/100 km^2 (SD=1/100 km^2) in 2012, resulting in a mean population abundance in the study area of 248 bears (SD = 27) (Table 1.5). The posterior distributions of the activity centers (i.e., map of population density) shows a non-uniform distribution of individuals across the landscape (Figure 1.7a), and reflects in part the spatial pattern of detections (Figure 1.6). Estimated σ was larger for males than females, with mean circular home range sizes of 740 km^2 (15.3 km radius) for males and 310 km^2 (9.9 km radius) for females. Mean baseline detection probability (exp(λ_0)) was 5%. We identified a significant behavioral response (α) that increased detection probability by 3-4% all else being constant, to a mean detection probability of 9%. Detection probability of males (δ) was significantly lower than females' by 4%, decreasing to 1% (Table 1.5).

Table 1.5. Posterior summaries of model parameters for a black bear study in southern New York in 2012. Estimates are from the model with all habitat covariates for population density and detection probability (Full) and across all models with habitat covariates selected with the indicator variable approach (Ind_Vars). We define D as the number of bears / 100 km^2; N is the number of estimated activity centers in the study area; σ is the shape parameter that determines the shape of the decreasing detection probability related to distance, distinguishing between males (M) and females (F), with $\sigma\sqrt{5.99}$ as home range radius; $\exp(\lambda_0)$ is the baseline detection probability; α is the behavioral response on detection probability, where $\exp(\lambda_0+\alpha)$ is the new detection probability, all else being constant; δ is the effect of gender on detection probability, where $\exp(\lambda_0+\delta)$ is the detection probability of males, all else being constant.

Parameter	**Model**	**Mean**	**S.D.**	**2.5%**	**Median**	**97.5%**
Density	Full	9.1	1.0	7.6	8.9	11.3
	Ind_Vars	9.2	1.0	7.6	9.1	11.6
N	Full	248.2	26.9	207	244	309
	Ind_Vars	251.7	28.8	207	248	318
σ_M	Full	6.27	0.45	5.46	6.25	7.24
	Ind_Vars	6.29	0.49	5.45	6.25	7.36
σ_F	Full	4.06	0.18	3.69	4.06	4.41
	Ind_Vars	4.08	0.19	3.71	4.09	4.46
λ_0	Full	-2.97	0.17	-3.30	-2.97	-2.66
	Ind_Vars	-2.93	0.18	-3.29	-2.93	-2.60
α	Full	0.51	0.16	0.21	0.51	0.83
	Ind_Vars	0.53	0.16	0.22	0.52	0.86
δ	Full	-1.86	0.21	-2.27	-1.86	-1.45
	Ind_Vars	-1.85	0.21	-2.27	-1.85	-1.44

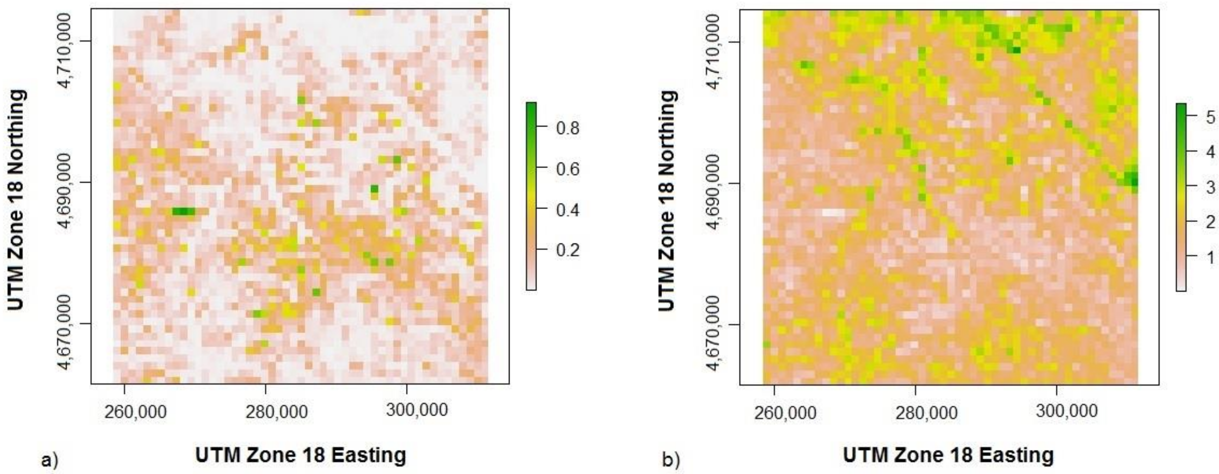

Figure 1.7. For a study of black bears in southern New York in 2012, plots of the a) posterior mean density of activity centers per landscape pixel and b) the logarithm of the coefficients of variation (CV) of the posterior density per landscape pixel.

Using the indicator variable approach, the top model carried 3% of the posterior weight in 2012, with the top five models carrying a cumulative 10.1% (Table 1.6). We compared the results from the top model against the full model without the indicator approach (which we refer to as “full model” from here on). Both the top and full models identified a significant increase in population density as percent forest landcover increased (95% CI level) (Table 1.7). A 25% increase in forest landcover (i.e., 1 SD) in a 1km landscape patch increased the probability of a bear being in the pixel from 0.01% to 1.7% in the full model and from 0.02% to 0.15% in the top model. However, the full model also identified a significant quadratic relationship with forest landcover, such that population density did not increase as much when forest landcover was >62% (Figure 1.8). This was calculated by back-converting the standardized covariates to obtain the means and standard deviations of percent habitat cover and applying the parameter estimates to Eqns (4) and (5). The 62% threshold was the point of inflection in the full model, calculated by setting the second derivative of the full model to zero and solving

Table 1.6. Top five models by posterior weight for habitat covariates on population density and detection probability for a black bear study in southern New York in a) 2011 and b) 2012. We conducted model selection with the indicator variable approach for habitat covariates on both population density and detection probability in 2012, but only habitat covariates on detection probability in 2011.

a)

	2011 Models		**Prior Weight**	**Posterior Weight**
	Density	**Detection**		
1)	N/A	None	0.0313	0.253
2)	N/A	Forest	0.0313	0.132
3)	N/A	Forest + Ag + Road	0.0313	0.092
4)	N/A	Forest + Ag	0.0313	0.091
5)	N/A	Forest + Ag + Road + Shrub	0.0313	0.089

b)

	2012 Models		**Prior Weight**	**Posterior Weight**
	Density	**Detection**		
1	Forest + Ag	Forest	0.0002	0.030
2	Forest	Forest + Ag	0.0002	0.028
3	Forest + Forest^2 + Ag	Shrub + Road	0.0005	0.015
4	Forest + Ag	Forest + Ag	0.0002	0.015
5	Forest + Ag + TPI	Forest	0.0002	0.014

Table 1.7. Posterior summaries of model parameters and habitat covariates on population density for a black bear study in southern New York in 2012. Estimates are from the full model with all habitat covariates (Full) and the top model (Top) identified with the indicator variable approach. Baseline density is exp(Intensity)/N; the effect of one standard deviation change in a habitat covariate is calculated by addition to the Intensity parameter. The top model included only forest and agricultural landcover on population density. Habitat covariates in bold indicate significance at 95%CI; a "*" indicates significance only at 90%CI.

Parameter	**Model**	**Mean**	**SD**	**2.5%**	**Median**	**97.5%**
Intensity	Full	-3.54	0.53	-4.72	-3.46	-2.73
	Top	-3.0	0.47	-4.17	-2.88	-2.30
Forest	**Full**	5.01	1.48	2.07	4.95	7.79
	Top	2.10	0.93	0.79	1.96	4.26
Forest^2	**Full**	-2.39	1.10	-4.54	-2.37	-0.42

Table 1.7. (Continued)

Agriculture	Full	1.30	1.19	-0.91	1.25	3.67
	Top	1.65	0.90	0.31	1.61	3.68
Shrub/ grass	Full	-0.54	0.48	-1.64	-0.50	0.29
Road density	Full	0.08	0.25	-0.47	0.10	0.51
TPI	Full	-1.19	1.17	-3.49	-1.22	1.28
Latitude	Full	-0.014	0.008	-0.028	-0.014	0.002

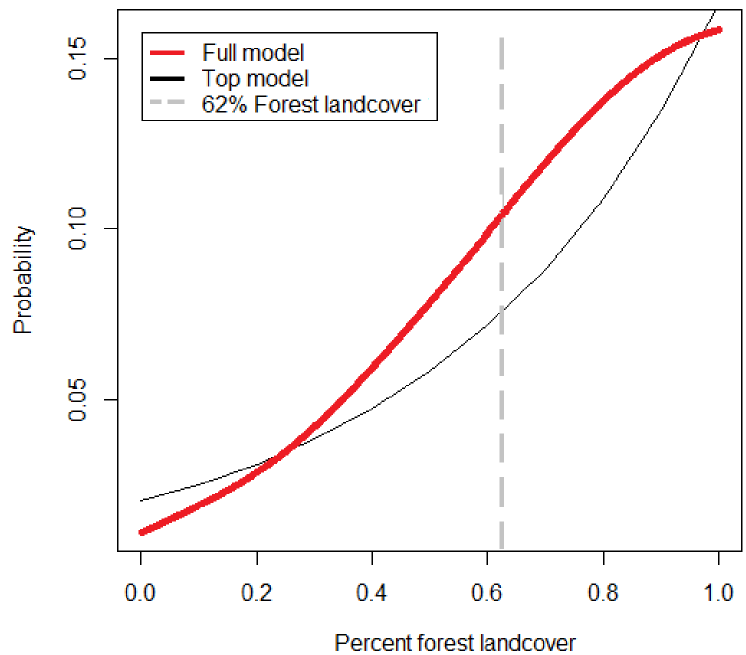

Figure 1.8. Estimated increase in in the probability of a bear being in a landscape pixel as percent forest landcover increased in the study area in southern New York, according to the models in 2012 with either all habitat covariates (Full model) or only percent forest and agriculture landcover types (Top model) on population density. The point of inflection at 62% in the full model was calculated by setting the second derivative to 0, i.e., $f''(FullModel) = 0$ and solving for the percent forest landcover.

for percent forest landcover. We identified a significant but smaller positive effect of agricultural landcover on population density in the top model, wherein a 23% increase in agricultural landcover resulted in an increase in probability from 0.02% to 0.11% of a bear being in a 1km landscape patch. No significant relationships between shrub/grassland landcover, road density, or TPI on population density were identified in any of the models. We identified a slight decrease in population density as latitude increased in the full model, significant at the 90%CI level (Table 1.7). Detection probability increased significantly from 5% to 7% when forest landcover increased by 25% in the top model (Table 1.8). Detection probability also increased with TPI in the full model from 5% to 7% when elevation increased by a mean of 1 SD (actual change in elevation not calculated because value of 1 SD varied spatially) at the 90%CI level.

Table 1.8. Posterior summaries of habitat covariates on detection probability for a black bear study in southern New York in 2012. Estimates are from the full model (Full) with all habitat covariates and the top model (Top) identified with the indicator variable approach. The effect of one standard deviation change in a habitat covariate is calculated by addition to λ_0. Habitat covariates in bold are significant at 95%CI; a "*" indicates significance only at 90%CI.

Parameter	**Model**	**Mean**	**SD**	**2.5%**	**Median**	**97.5%**
Forest	Full	0.40	0.28	-0.14	0.40	0.96
	Top	0.22	0.07	0.09	0.22	0.35
Agriculture	Full	0.26	0.28	-0.28	0.26	0.81
Shrub/grass	Full	-0.52	1.98	-4.40	-0.46	3.16
Road density	Full	0.38	1.98	-3.25	0.32	4.28
TPI	Full*	0.25	0.15	-0.035	0.25	0.54

The SCR model was generally unable to estimate parameters of population density with the 2011 data. Most chains failed to converge, based on either the R-hat statistic for convergence or visual inspection of trace plots with posterior distributions that were multi-modal (Table 1.9). For example, although the estimate of population density in the full model converged based on the R-hat statistic, the right tail of the posterior distribution was severely truncated by the upper bound of the prior distribution of 500 individuals (Table 1.9). Therefore, we focus the model results from 2011 on patterns in detection probability only. We detected a significant positive behavioral response (α) on detection probability (Table 1.9). The top model using the indicator variable approach carried 25% of the posterior weight (Table 1.6), and did not detect an effect of any habitat covariates on detection probability. However, both the second model (13%) and full model detected a significant effect of forest landcover increasing with detection probability (Table 1.6 and Table 1.10).

Table 1.9. Posterior summaries of population density and behavioral response on detection probability for a black bear study in southern New York in 2011. Estimates are from the full model with all habitat covariates (Full) and across all models using the indicator variable approach (Ind_Vars). We define D as the number of bears / 100 km^2; N is the number of estimated activity centers in the study area; α is the behavioral response on detection probability. Estimates of σ, λ_0, and δ failed to converge based either on the R-hat statistic (R-hat ≤ 1.1) or visual inspection of trace plots of the MCMC histories.

Parameter	**Model**	**Mean**	**SD**	**2.5%**	**Median**	**97.5%**	**R-hat**
Density	Full	17.4	0.7	15.5	17.6	18.1	1.1
	Ind_Vars	16.7	1.3	13.3	17.1	18.1	1.4
N	Full	479.3	20.1	427	485	500	1.1
	Ind_Vars	460.3	36.2	366	471	500	1.4
α	Full	0.76	0.17	0.42	0.76	1.11	1.3
	Ind_Vars	0.92	0.19	0.56	0.92	1.28	1.2

Table 1.10 Posterior summaries of habitat covariates on detection probability for a black bear study in southern New York in 2011. Estimates are from the full model with all habitat covariates. The top model using with the indicator variable approach found no significant habitat covariates on detection probability. Habitat covariates in bold are significant at 95%CI; a "*" indicates significance only at 90%CI.

Parameter	Model	Mean	SD	2.5%	Median	97.5%
Forest	Full	0.89	0.35	0.22	0.88	1.62
Agriculture*	Full	0.52	0.35	-0.14	0.51	1.23
Shrub/grass	Full	0.16	2.14	-5.11	0.40	3.81
Road Density	Full	0.14	2.14	-3.48	-0.10	5.34
TPI	Full	0.08	0.20	-0.30	0.08	0.47

Discussion

Our data suggest that the black bear population we studied inhabits a wide range margin, but does not represent the colonizing front of the Southern Black Bear Range in New York. We suggest this based on low estimated population density, patterns of resource use of landcover types that differed from expectations, and high genetic diversity. The low bear density that we estimated (9 bears/100 km^2) is consistent with expectations from diffuse dispersal in expanding ranges [14,99,100], and is much lower than densities reported from non-expanding populations in the United States. For example, bear densities are higher in the Northern Black Bear Range in New York (20 bears/100 km^2) [23], adjacent north-central Pennsylvania [41,57], Great Smoky Mountains (>29 bears/100 km^2) [101], and coastal North Carolina and Virginia (47 bears/100 km^2) [102]. On the other hand, our density estimate of 9 bears /100 km^2 is more similar to that of a colonizing front of a black bear population, in the central Appalachian Mountains in Kentucky (8 bears/100 km^2) [19].

Range boundaries are often characterized by patchy and suboptimal habitats for species, resulting in spatial patterns in density that may differ from expectations under traditional or unaltered habitats [14]. Bears may adapt to available resources so that resource use differs from what would be expected in the core of their population range.

For example, while population density increased with percent forest, a traditional habitat, we also found that population density and detection probability increased in areas with higher percentages of agriculture, a landcover type that bears have been documented to avoid [18,47] and is an anthropogenic, non-natural, but concentrated source of food. Another pattern of resource use we observed that may reflect the increasing presence and influence of humans on the landscape at the range margin is the quadratic effect of forest landcover on population density. Population density did not increase as much when forest landcover was >62% (Figure 1.8), or in other words, bears were less inclined to place their home ranges in areas with >62% forest landcover. Consistent with previous research, this suggests that bears may benefit from and were likely obtaining resources from a diversity of landcover types [103,104]. Increasing forest fragmentation and habitat edges in the wide range margin may increase the availability of other resources, such as berries and early successional plant species [105] and correlate with increases in agriculture landcover. Especially in the summer, agriculture may be a significant food source before mature deciduous forests produce their fall crops of hard mast [103,104]. These patterns of resource use might not have been observable in core parts of the range where there is potentially less forest fragmentation and habitat patchiness.

A latitudinal review of percent landcover revealed strong variation and patchiness in landcover throughout the study area. In conjunction with low population density, this suggests that the margin of the expanded range is wide. We chose the location for our study area to encompass the transition from presumed historical and expanded range margins. However, range extents can be difficult to define or determine [106]. Assuming that the historical range boundary for bears in southern New York related primarily to habitat features, one would expect a gradient or compositional difference in landcover corresponding with the historic and expanded regions of the bear range. However, an assessment of landcover in the study area showed no marked difference in composition between historical and expanded ranges (Figure 1.3). Although there was a slight difference (10%) in mean percent of forest landcover between latitudinal extremes of the study area, forest landcover was patchy and ranged from 0-100% throughout most of the study area (Figure 1.3). Patterns of variation in agricultural landcover were similar. Road density was markedly greatest in middle latitudes due to U.S. Interstate Highways I-86 and I-390. This general absence of a habitat gradient suggests that perhaps habitats have become more human-dominated since the description of the historical range, and/or that the study area was north of the historical bear range and did not in fact include both historic and expansion range portions. If the latter is true, we may have been able to detect a stronger latitudinal gradient in population density if the study area had been farther south or had a greater latitudinal extent, given that the full model in 2012 identified a slight decrease in population density within the study area with increasing latitude.

Genetic diversity measured in both years was high and comparable to that of non-expanding black bear populations [19,107,108]. This further suggests that the bear population in the study area is not at the leading edge of a range expansion, where genetic diversity is often low [10,109,110]. However, two genetic patterns in 2011 were consistent with expectations from population admixture, such as from an incursion of bears from north-central Pennsylvania [40,41]. First, the significant overall deficit of heterozygotes in 2011 could arise if immigrants had different allele frequencies, resulting in a Wahlund effect [108,111]. Second, the allelic richness was slightly higher in 2011 compared with 2012. For admixture to have caused these patterns it must have been ephemeral or episodic, or we should see the same pattern of heterozygote deficiency in 2012. Loss of an ephemeral signature of admixture is possible since fecundity is high [40,112,113], and as few as one generation of random mating can return genotype frequencies to HWE [114]. Given the small population genetic effect sizes in this study, more robust tests for immigration and admixture with more extensive geographic sampling would be necessary. Although genetic structure or deviations from HWE at range margins can be a result of drift, migration or non-random mating [114–117], there is no evidence to suggest such forces acted on the population. Our genetic analyses did not detect any conclusive signature of current range expansion in the study area, but identified patterns that might suggest population admixture.

Genotyping errors may partially account for the inconsistent genetic patterns between 2011 and 2012 [118]. We strove to minimize genotyping errors in primarily two ways. First, we applied a two-stage process for scrutinizing and collapsing 1-2 MMs. While genotyping error rates in our study (1.9 – 18.8% across loci and sampling years) were within the approximate ranges of 0 – 39% reported in other studies [39,63,118–120], six of the seven microsatellite loci in 2011 exhibited per-genotype error rates that were greater than 6% and also greater than in 2012 (Table 1.1). Low error rates can lead to incorrect estimates of allele frequencies, Hardy- Weinberg disequilibrium and possible demographic misinterpretations [68,118,121], while high error rates can also positively bias estimates of population size and density [30,39]. Secondly, we minimized genotyping errors by removing samples with ≥3 missing loci and potentially contaminated (i.e. ≥3 alleles) genotypes. This led to reductions in sample size of only 4% and 3% in 2011 and 2012, respectively. There is no reason to expect that the removed samples were a nonrandom subset, and any population size estimation bias would be small. If remnant genotyping errors after genotype replication and MM analysis significantly contributed to population overestimation, then the bear density in our study area would be even lower than the estimate we report.

Changes to field sampling and DNA extraction protocols in 2012 potentially explain the lower DNA extraction rate and genotyping error rates in 2012. Trail cameras placed at hair snare sites in 2011 indicated that bears were visiting snares but often depositing poor quality or no hair samples on the barbed wire. Therefore, we added a second strand of barbed wire in 2012 in an effort to increase encounters of individuals.

This led to an increase in snare success rate*.* However, we anecdotally noticed that hair samples collected from the lower wire had fewer follicles and high-quality guard hairs than samples collected from the top wire. The higher quality hair samples collected from the top wire suggests more direct contact between hair and barbs on the top wire because having two barbed wires directed passage between the two wires rather than by glancing over or under a single wire, as in 2011. As a result, we extracted DNA from more samples collected from the top wire than the lower wire and pooled approximately 4x more samples in 2012 than in 2011. This resulted in a smaller proportion of the collected hair samples being analyzed in 2012 (56% vs. 90% in 2011), despite a 4x increase in the number of total collected hair samples (1,985 vs. 500 in 2011). Furthermore, the higher quality hair samples from the top wire in 2012 may have decreased the rate of stochastic genotyping errors in 2012. DNA quality may have been higher in 2012 because we also further minimized DNA degradation in 2012 by conducting all extractions and replicate genotyping within three months of collection. Conducting genotyping in larger batches reduced the number of freeze-thaw cycles and helped to maintain DNA quality. On the other hand, DNA extraction and genotyping of samples in 2011 required nine months, potentially contributing to DNA degradation with extended periods of processing and freeze-thaw cycles.

Seasonal shifts in black bear behavior and snare relocation may partially explain the changes in snare success and detections per snare in both years. In 2012, both snare success and the number of detections per snare in 2012 decreased as the season progressed. These measures may have been high in the first half of the season due to molting of winter coats in early summer (May and June) [122] and the search for food [123,124], further enhanced by the strong behavioral response in detection, presumably due to baiting. A decrease in snare success and detections per snare in the second half of the season in 2012 may have been due to bears' motivations shifting to reproductive behaviors as summer progressed [123,124] in conjunction with lower movement rates in late summer [125–127]. Snare relocation is a technique used to avoid or decrease snare habituation, so moving snares may have also interacted with seasonal behaviors of bears to further decrease snare success. However, snare success and detections per snare in the beginning of the 2011 season were lower than in 2012 and also increased as the season progressed. This may have been due to frequent precipitation in the first half of the season washing away loosely-snared hair samples before collection, initial inexperience of the field crew in identifying black bear hair samples, and interacting effects with the snare relocation.

High snare success and maximizing the number of detected individuals and spatial recaptures per individual are necessary for precise and accurate population estimation. Given the resources that SCR efforts require, aspects of sampling design should be considered for ensuring success. As indicated by the increased number of samples collected in 2012, the additional strand of barbed wire increased detection probability at no significant cost to snare construction or site selection. Also, prudent site selection increases detection probability, such as by placing hair snare sites on unobstructed game paths and in areas with little understory branches, brush, or debris. Furthermore, spacing between snares should ideally be able to collect spatial recaptures of individuals, i.e., be able to detect individuals in multiple places within their activity ranges [89,128,129]. Snares should also be at sites for sufficient time to detect individuals before relocation to new areas. In concert, these are considerations to help maximize the success of SCR efforts, be it over multi-year sampling or within a single season.

Estimates of home range size, 740 km^2 (15.43 km radius) for males and 310 km^2 (9.9 km radius) for females were large in comparison to estimates in other black bear populations [23,47,57,77,101,126]. This suggests sub-optimal resources in the range margin. Areas of sub-optimal or fragmented habitat may require individuals to travel farther to acquire necessary resources and potentially increase territoriality in order to maintain access to those resources [130–133]. Increased territoriality and larger home range sizes could therefore lead to the lower population density that we observed. However, estimates of home range size in our study area may have been inflated by the bait lures and scent attractants that we used to increase detection probability. Given the increase in detection probability after a first detection, it is possible that individuals altered movement patterns and travelled beyond their normal home ranges, thereby inflating estimated home range sizes. Had only a portion of our snares been baited, it would have been possible to determine the extent to which baiting may have altered home ranges by implementing a snare-specific covariate for baiting on detection probability [23].

Estimates of density and home range size may have been affected by assumptions of the SCR model. For example, it may not be realistic to assume circular home ranges or that detection probabilities decreased with increasing Euclidean distance according to a half normal distribution. Landscapes are not uniform in use due to features such as terrain and resource availability [134,135], so home ranges are not likely to be circular, nor are decreases in detection probability simply a function of Euclidean distance. As a result, some SCR models have begun to use measures of ecological distance instead [136]. However, while violating such assumptions may affect estimates of home range size and movement patterns, some preliminary work (C. Sutherland et al., unpublished) suggests that the bias on estimates of population size is minimal. Also, little to no work has been conducted or published on the potential impacts of activity centers or home ranges that are not identically and independently distributed (I.I.D.). I.I.D. activity centers are a third SCR model assumption, even though it may not be realistic [137], such as with cubs, which have the same activity centers as their mother. Patterns of philopatry have been shown to be stronger in females than males, such that females tend to have activity centers and home ranges closer to their natal ones than males [138,139]. However, this sex-based bias in dispersal may not be as marked in low density populations [138] such as the bear population studied here. Consequences of incorrectly specifying the distribution of activity centers have not been investigated, and other reasonable models could be explored in the future.

The inability to estimate many of the model parameters with the 2011 data highlights several important aspects of modeling, mainly that sparse data sets have limited power. Although the number of uniquely detected individuals did not differ greatly between 2011 and 2012 (159 vs 169), the average number of recaptures in 2011 was approximately half that in 2012 (1.5 vs 2.9). The low detection rates led to posterior distributions of abundance and density that were truncated by the upper limit of 500 individuals. Also, complex models with many parameters, such as the SCR model in this study, perform poorly when datasets are sparse. A less demanding model with fewer parameters of interest may have been more appropriate for the 2011 dataset. Lastly, the choice of prior distributions can be important, particularly with sparse datasets. Posterior distributions with either the normal or uniform distributions were similar when they converged. In other cases, such as with the 2011 data, posterior distributions for some parameters converged only when the prior distributions were normal. Differences in the model results based on specification of prior distributions for the habitat covariates illustrate the influence that priors can have on parameter estimation. Although arguments can be made for uninformative or flat priors to allow inferences solely from the data [140], carefully chosen, even weakly informative priors can help MCMC chains converge to useful posterior distributions when data are sparse [141]. Sparse data sets and informative priors run the risk of posterior distributions that simply reflect the prior distributions [142], so evaluating models under different prior distributions is important.

Management Implications

This non-invasive, genetic, spatial capture-recapture study provides the first estimates of black bear population density in the Southern Black Bear Range of New York. Our results indicate that while the black bear population density is low, the leading edge of the expanding range is likely north of our study area. However, the patterns in population density and detection probability estimated by the SCR model still allow us to identify, quantify, and anticipate potential spatial patterns of population growth and future range expansion elsewhere. As bears encounter areas with nontraditional habitat and overall differences in resource availability, patterns in resource use may change. For example, we documented changes in the spatial patterns of bear density when forest landcover was >62%, no significant avoidance of areas with high road density (an anthropogenic landscape feature), but greater bear densities with higher percent of agricultural landcover (an anthropogenic landscape feature). Given the spatial variation of landcover in the study area, any further population growth or range expansion may not be limited by the human-influenced landscapes that continue north of the study area. It is unknown what amount of habitat fragmentation or landscape features would limit range expansion in the absence of active management, as bears can inhabit dense urban areas [112,143].

The challenge for black bear management in New York for the next decade, as identified by stakeholder input, is to stabilize the black bear population and prevent further range expansion and establishment [144]. To identify regions that may experience continued black bear population growth and therefore areas in which to focus management, we recommend pairing continued SCR efforts with a small telemetry study to jointly estimate and monitor patterns in population density and resource use [84]. This dual approach would provide further insight into the mechanisms and implications of range expansion, as range expansion is often driven by scale-dependent dispersal and movement patterns of individuals [100,116,145–147].

Continued study and monitoring would help evaluate the effectiveness of new management regimes and assist in the development of appropriate proactive as well as responsive black bear management. For example, if preventing furtherrange expansion of black bears is desired, managers might consider additional hunting areas on the margin of existing bear ranges or additional hunting seasons timed to coincide with annual dispersal of yearling bears (i.e., spring).

APPENDIX 1

A1.1. Hair snare locations, detection histories, and covariates on detection probability and population density for a black bear study in southern New York, in 2011 and 2012.

2011 Hair snare locations for a black bear study in southern New York.

ID = Unique, identifying number for each hair snare location
Cell = From A1 to G8 (n=64), the grid-cell containing the hair snare
Easting, Northing = UTM Zone 18N coordinates for each hair snare location
Day = From Monday to Saturday, the day of the week each hair snare was checked for samples and rebaited. A sampling week spanned Monday to Saturday, so that detections of individuals were assigned to the week in which it was detected.
Set = 1,2: the first or second half (5wks) of the sampling season in which the snare was in operation. A snare with a 3 was in operation during the entire 10 weeks of sampling.

ID	Cell	easting	northing	day	set
1	A1	310551	4713852	Tuesday	1
2	A1	305601	4710794	Saturday	1
3	A1	304449	4707206	Tuesday	1
4	A1	309223	4712339	Tuesday	1
5	A3	310358	4696458	Monday	1
6	A3	309687	4700368	Monday	1
7	A3	307902	4698392	Monday	1
8	A3	305632	4697765	Monday	1
9	A5	308410	4686575	Monday	1
10	A5	307284	4685711	Monday	1
11	A5	304969	4684636	Monday	1
12	A5	307266	4686101	Monday	1
13	A7	306088	4671325	Monday	1
14	A7	307700	4673150	Monday	1
15	A7	307273	4670413	Monday	1
16	A7	309610	4670852	Monday	1
17	B2	299865	4702752	Monday	1
18	B2	298660	4706143	Monday	1
19	B2	303780	4707712	Monday	1
20	B2	297824	4706181	Monday	1
21	B4	300712	4693627	Tuesday	1
22	B4	302619	4690946	Monday	1
23	B4	300686	4689873	Monday	1
24	B4	302605	4690961	Monday	1
25	B6	301940	4680877	Monday	1
26	B6	301558	4679228	Monday	1
27	B6	300764	4679090	Monday	1
28	B6	299000	4676998	Monday	1

29	B8	300432	4664925	Tuesday	1
30	B8	301297	4664635	Tuesday	1
31	B8	301897	4667395	Tuesday	1
32	C1	293094	4711906	Wednesday	1
33	C1	293956	4711469	Wednesday	1
34	C1	293840	4715911	Wednesday	1
35	C1	296029	4712905	Wednesday	1
36	C3	293646	4697171	Tuesday	1
37	C3	295664	4697392	Tuesday	1
38	C3	295900	4699067	Tuesday	1
39	C5	292880	4688446	Tuesday	1
40	C5	292620	4683598	Tuesday	1
41	C5	293203	4688032	Tuesday	1
42	C5	294224	4689583	Tuesday	1
43	C7	295328	4665791	Tuesday	1
44	C7	294343	4670162	Tuesday	1
45	C7	294468	4671917	Tuesday	1
46	D2	288571	4702250	Saturday	1
47	D2	288746	4701002	Wednesday	1
48	D2	286163	4702039	Thursday	1
49	D4	286830	4695610	Tuesday	1
50	D4	289933	4695827	Tuesday	1
51	D4	285878	4691719	Tuesday	1
52	D6	284387	4677918	Thursday	1
53	D6	288180	4679469	Tuesday	1
54	D6	288476	4677536	Wednesday	1
55	D6	289695	4681655	Thursday	1
56	D8	286269	4666022	Thursday	1
57	D8	288293	4662604	Wednesday	1
58	D8	287255	4662549	Wednesday	1
59	D8	288371	4661237	Tuesday	1
60	E1	282242	4708296	Thursday	1
61	E1	281200	4710925	Thursday	1
62	E1	278930	4711821	Saturday	1
63	E1	279137	4710612	Saturday	1
64	E3	282525	4697047	Wednesday	1
65	E3	281710	4696851	Wednesday	1
66	E3	279595	4700094	Wednesday	1
67	E3	278964	4701738	Wednesday	1
68	E7	279337	4670981	Thursday	1
69	E7	280362	4672421	Thursday	1
70	E7	282962	4668003	Thursday	1
71	E7	282375	4672929	Thursday	1

72	F2	277588	4706936	Thursday	1
73	F2	277957	4699755	Thursday	1
74	F4	272544	4690411	Thursday	1
75	F4	276640	4690508	Thursday	1
76	F4	276646	4689245	Thursday	1
77	G1	269629	4708889	Saturday	1
78	G1	268628	4708259	Friday	1
79	G1	268406	4711145	Friday	1
80	G1	267140	4711784	Friday	1
81	G3	266923	4699242	Friday	1
82	G3	267190	4695953	Friday	1
83	G3	269137	4698742	Friday	1
84	G3	269412	4699821	Friday	1
85	G5	269189	4687625	Friday	1
86	G5	267332	4685322	Friday	1
87	G5	269403	4687103	Friday	1
88	H2	263397	4700270	Friday	1
89	H2	260113	4701693	Friday	1
90	H4	264611	4693888	Friday	1
91	H4	260635	4693037	Friday	1
92	H4	263600	4691337	Friday	1
93	H4	262132	4689850	Friday	1
94	H6	262697	4680526	Friday	1
95	H6	261890	4676433	Friday	1
96	H6	261023	4678789	Friday	1
97	H6	264552	4678216	Friday	1
98	A2	304900	4703119	Monday	2
99	A2	309742	4704074	Monday	2
100	A2	306077	4704606	Monday	2
101	A2	306439	4702347	Monday	2
102	A4	307870	4692235	Monday	2
103	A4	307678	4693689	Monday	2
104	A4	307538	4688571	Monday	2
105	A4	308104	4688818	Monday	2
106	A6	305312	4681125	Monday	2
107	A6	305825	4679248	Monday	2
108	A6	304740	4677014	Monday	2
109	A6	306626	4675291	Monday	2
110	A8	308214	4664013	Monday	2
111	A8	306980	4665497	Monday	2
112	A8	306792	4666977	Monday	2
113	A8	307173	4668354	Monday	2
114	B1	301847	4712513	Monday	2

115	B1	301867	4710630	Monday	2
116	B1	300563	4712022	Monday	2
117	B1	298285	4711532	Monday	2
118	B3	298499	4695890	Saturday	2
119	B3	300978	4699971	Saturday	2
120	B3	299895	4694437	Saturday	2
121	B5	300646	4681696	Wednesday	2
122	B5	302076	4685369	Wednesday	2
123	B5	301321	4682683	Wednesday	2
124	B5	298720	4685348	Wednesday	2
125	B7	303513	4674857	Monday	2
126	B7	303107	4672070	Monday	2
127	B7	299200	4670368	Monday	2
128	B7	300836	4673800	Monday	2
129	C2	296374	4705753	Wednesday	2
130	C2	294363	4704882	Wednesday	2
131	C2	291146	4706515	Wednesday	2
132	C2	291499	4706850	Wednesday	2
133	C5	294942	4683144	Tuesday	2
134	C5	294440	4683138	Tuesday	2
135	C5	291824	4687632	Wednesday	2
136	C6	294810	4679833	Tuesday	2
137	C6	292178	4679305	Tuesday	2
138	C6	296765	4676252	Tuesday	2
139	C8	297301	4667222	Tuesday	2
140	C8	292169	4663646	Tuesday	2
141	C8	292571	4662402	Tuesday	2
142	D1	288114	4710325	Tuesday	2
143	D1	288604	4709332	Tuesday	2
144	D1	286169	4707406	Saturday	2
145	D1	290554	4709491	Tuesday	2
146	D3	284505	4696104	Thursday	2
147	D3	290380	4696140	Thursday	2
148	D3	285602	4698222	Thursday	2
149	D3	290372	4700539	Thursday	2
150	D5	287810	4686695	Wednesday	2
151	D5	289060	4685993	Wednesday	2
152	D5	289176	4683802	Wednesday	2
153	D5	286724	4685620	Wednesday	2
154	D7	286831	4669451	Tuesday	2
155	D7	286961	4674838	Tuesday	2
156	D7	285092	4671661	Tuesday	2
157	E2	280666	4702001	Tuesday	2

158	E2	279761	4703258	Tuesday	2
159	E2	284285	4703668	Tuesday	2
160	E4	280671	4693605	Wednesday	2
161	E4	278344	4691852	Wednesday	2
162	E4	279381	4692680	Wednesday	2
163	E5	280477	4683747	Wednesday	3
164	E5	282364	4685347	Wednesday	2
165	E5	279783	4684890	Wednesday	3
166	E5	280669	4685853	Wednesday	3
167	E6	279631	4676826	Thursday	2
168	E6	279802	4678937	Thursday	2
169	E6	279478	4681335	Thursday	2
170	F1	276537	4711878	Tuesday	2
171	F1	272402	4708381	Tuesday	2
172	F1	273042	4707329	Tuesday	2
173	F2	273755	4703975	Tuesday	2
174	F2	272549	4701118	Thursday	2
175	F2	277116	4702376	Tuesday	2
176	F3	273382	4698801	Thursday	2
177	F3	272386	4699552	Thursday	2
178	F3	277671	4695197	Saturday	2
179	F3	275286	4694121	Saturday	2
180	F5	274298	4685317	Friday	2
181	F5	277651	4683918	Friday	2
182	F5	277231	4683585	Friday	2
183	F6	277431	4679015	Thursday	2
184	F6	276922	4674417	Thursday	3
185	F6	274375	4680616	Thursday	2
186	F7	276446	4673162	Friday	2
187	F8	274278	4665467	Thursday	2
188	F8	274447	4667117	Thursday	2
189	G1	268533	4710062	Friday	2
190	G2	268863	4700709	Thursday	2
191	G2	270472	4702510	Thursday	2
192	G2	268232	4705073	Thursday	2
193	G4	267600	4691818	Wednesday	2
194	G4	269032	4692557	Wednesday	2
195	G4	269718	4689912	Wednesday	2
196	G4	271473	4691874	Wednesday	2
197	G6	267321	4680449	Friday	2
198	G6	270455	4677973	Friday	2
199	G6	271106	4680071	Friday	2
200	G6	271644	4676222	Friday	2

201	H1	265068	4708349	Friday	2
202	H1	264992	4709374	Friday	2
203	H1	263066	4712572	Friday	2
204	H1	262183	4711211	Friday	2
205	H2	261813	4701282	Friday	2
206	H2	260079	4702312	Friday	2
207	H3	264045	4696771	Friday	2
208	H3	263019	4695075	Friday	2
209	H3	263188	4698313	Friday	2
210	H3	260824	4699592	Friday	2
211	H5	261139	4685667	Thursday	2
212	H5	261878	4684442	Thursday	2
213	H5	264782	4686250	Thursday	2
214	H5	264863	4684743	Thursday	2
215	H7	260324	4670023	Friday	2
216	H8	265007	4664171	Friday	2
217	H8	264765	4667610	Friday	2
218	H8	262850	4666604	Friday	2
219	H8	260651	4663904	Friday	2

2012 Hair snare locations for a black bear study in southern New York.

ID = Unique, identifying number for each hair snare location
Cell = From A1 to G8 (n=64), the grid-cell containing the hair snare
Easting, Northing = UTM Zone 18N coordinates for each hair snare location
Day = From Monday to Saturday, the day of the week each hair snare was checked for samples and rebaited. A sampling week spanned Monday to Saturday, so that detections of individuals were assigned to the week in which it was detected.
Set = 1,2: the first or second half (5wks) of the sampling season in which the snare was in operation. A snare with a 3 was in operation during the entire 10 weeks of sampling.

ID	Cell	easting	northing	day	set
1	A1	310567	4713893	Friday	1
2	A1	309713	4712277	Friday	1
3	A1	308401	4712389	Friday	1
4	A3	310126	4696272	Friday	1
5	A3	310344	4696425	Friday	1
6	A3	308003	4698471	Friday	1
7	A3	305620	4697874	Friday	1
8	A5	308410	4686575	Thursday	1
9	A5	307285	4685723	Thursday	1
10	A7	306088	4671325	Friday	1
11	A7	307273	4670413	Thursday	1
12	B2	299834	4703117	Thursday	1

13	B2	298668	4705939	Thursday	1
14	B2	297730	4705758	Thursday	1
15	B4	300719	4693619	Friday	1
16	B4	301900	4691031	Friday	1
17	B4	300719	4690210	Friday	1
18	B8	301897	4667395	Thursday	1
19	C1	295697	4712956	Thursday	1
20	C1	295949	4712432	Thursday	1
21	C1	294058	4713096	Thursday	1
22	C3	293586	4697174	Wednesday	1
23	C3	295672	4697395	Wednesday	1
24	C3	295900	4699067	Wednesday	1
25	C5	294729	4683116	Wednesday	1
26	C5	294440	4683138	Wednesday	1
27	C5	292620	4683598	Wednesday	1
28	C5	291859	4687583	Wednesday	1
29	C7	294343	4670162	Thursday	1
30	C7	294468	4671917	Friday	1
31	C7	295013	4671702	Thursday	1
32	D2	288571	4702250	Wednesday	1
33	D2	288746	4701002	Wednesday	1
34	D6	289695	4681655	Thursday	1
35	D8	288293	4662604	Friday	1
36	D8	288534	4661300	Thursday	1
37	E1	281196	4710905	Tuesday	1
38	E1	282242	4708296	Tuesday	1
39	E1	278922	4711837	Friday	1
40	E1	279118	4710534	Friday	1
41	E3	282525	4697055	Wednesday	1
42	E3	281710	4696851	Wednesday	1
43	E3	279595	4700094	Thursday	1
44	E5	280215	4683417	Wednesday	1
45	E5	282402	4685297	Wednesday	1
46	E5	279849	4684891	Friday	1
47	E5	280947	4685841	Friday	1
48	E6	288476	4677536	Tuesday	1
49	E7	282375	4672929	Tuesday	1
50	E8	282962	4668003	Thursday	1
51	F2	277588	4706936	Tuesday	1
52	F2	277957	4699755	Tuesday	1
53	F6	277420	4679051	Tuesday	1
54	F6	274375	4680616	Tuesday	1
55	F6	274106	4679706	Tuesday	1

56	F6	288180	4679469	Tuesday	1
57	F8	274278	4665467	Friday	1
58	F8	274447	4667117	Friday	1
59	G1	269344	4708461	Tuesday	1
60	G1	268214	4708479	Tuesday	1
61	G1	268247	4711171	Tuesday	1
62	G1	267180	4711798	Tuesday	1
63	G5	269062	4687400	Monday	1
64	G5	266729	4687547	Monday	1
65	G5	265735	4686459	Monday	1
66	H2	263289	4701464	Monday	1
67	H2	260102	4701808	Tuesday	1
68	H2	260067	4702266	Tuesday	1
69	H4	264682	4693955	Monday	1
70	H4	261732	4693702	Monday	1
71	H4	263679	4691215	Monday	1
72	H4	262044	4689779	Monday	1
73	H6	262698	4680456	Tuesday	1
74	H6	264038	4678202	Monday	1
75	H6	261995	4676471	Monday	1
76	H6	261349	4678697	Monday	1
77	H8	264869	4664162	Thursday	1
78	H8	264765	4667610	Monday	1
79	H8	262850	4666604	Thursday	1
80	H8	260846	4663608	Monday	1
81	A2	304899	4703196	Friday	2
82	A2	309742	4704074	Friday	2
83	A2	306077	4704606	Friday	2
84	A2	306439	4702347	Friday	2
85	A4	307870	4692235	Friday	2
86	A4	307678	4693689	Friday	2
87	A4	307538	4688571	Friday	2
88	A4	308137	4688832	Friday	2
89	A5	304969	4684636	Friday	2
90	A6	308428	4680008	Friday	2
91	A6	305830	4679294	Friday	2
92	A6	306626	4675291	Friday	2
93	A7	305525	4672267	Friday	2
94	A8	308144	4664045	Friday	2
95	A8	306809	4666920	Friday	2
96	A8	307321	4668295	Friday	2
97	B1	301816	4712676	Thursday	2
98	B1	301867	4710630	Thursday	2

99	B1	300563	4712022	Friday	2
100	B3	298499	4695890	Thursday	2
101	B3	300978	4699971	Thursday	2
102	B3	302710	4699936	Thursday	2
103	B5	302076	4685369	Thursday	2
104	B5	301323	4682723	Friday	2
105	B7	300840	4673771	Thursday	2
106	B7	298313	4670678	Thursday	2
107	B8	300301	4664736	Thursday	2
108	C2	294374	4704864	Thursday	2
109	C2	292140	4705990	Thursday	2
110	C2	291155	4706533	Thursday	2
111	C5	293293	4688319	Thursday	2
112	C6	294810	4679833	Thursday	2
113	C6	292178	4679305	Thursday	2
114	C6	296601	4676142	Thursday	2
115	C8	295328	4665791	Thursday	2
116	C8	297301	4667222	Wednesday	2
117	C8	292169	4663646	Wednesday	2
118	C8	292571	4662402	Wednesday	2
119	D1	288114	4710325	Wednesday	2
120	D1	288604	4709332	Wednesday	2
121	D1	286455	4707557	Wednesday	2
122	D2	284234	4703742	Wednesday	2
123	D2	289248	4702457	Wednesday	2
124	D3	284505	4696104	Wednesday	2
125	D3	290365	4696133	Wednesday	2
126	D3	285595	4698214	Wednesday	2
127	D3	289862	4695713	Thursday	2
128	D3	290319	4700531	Wednesday	2
129	D4	285878	4691719	Thursday	2
130	D5	287794	4686773	Thursday	2
131	D7	286770	4669322	Wednesday	2
132	D7	286961	4674838	Wednesday	2
133	D7	285303	4671611	Thursday	2
134	E4	280671	4693605	Wednesday	2
135	E4	279381	4692680	Wednesday	2
136	E4	278629	4701105	Wednesday	2
137	E6	279631	4676826	Wednesday	2
138	E6	284388	4677958	Wednesday	2
139	E6	279802	4678937	Wednesday	2
140	E6	279478	4681335	Wednesday	2
141	E7	279751	4672471	Wednesday	2

142	E7	282155	4671999	Tuesday	2
143	F1	276507	4711831	Tuesday	2
144	F1	272371	4708377	Tuesday	2
145	F1	273197	4707386	Tuesday	2
146	F2	273763	4703976	Tuesday	2
147	F2	272549	4701118	Tuesday	2
148	F3	272386	4699552	Tuesday	2
149	F3	275331	4694164	Tuesday	2
150	F3	276676	4696185	Tuesday	2
151	F3	277679	4695187	Tuesday	2
152	F5	274314	4685350	Tuesday	2
153	F5	277828	4683320	Tuesday	2
154	F5	273590	4683258	Wednesday	2
155	F5	277267	4683557	Tuesday	2
156	F7	276478	4673110	Tuesday	2
157	G2	268940	4700793	Monday	2
158	G2	270430	4702449	Monday	2
159	G2	268179	4704918	Monday	2
160	G4	267592	4692062	Monday	2
161	G4	269682	4691347	Monday	2
162	G4	269718	4689912	Monday	2
163	G6	267321	4680449	Monday	2
164	G6	270422	4677709	Monday	2
165	G6	271683	4676160	Monday	2
166	H1	265077	4708301	Monday	2
167	H1	264978	4709440	Monday	2
168	H1	263087	4712580	Monday	2
169	H1	262213	4711362	Monday	2
170	H3	262314	4697119	Tuesday	2
171	H3	265422	4698837	Monday	2
172	H3	264693	4698641	Monday	2
173	H3	263067	4695124	Monday	2
174	H3	260497	4699619	Monday	2
175	H5	264831	4681775	Monday	2
176	H5	264494	4683525	Tuesday	2
177	H5	261156	4686322	Tuesday	2
178	H5	264836	4685365	Tuesday	2
179	H7	260324	4670023	Monday	2
180	H7	258607	4672097	Monday	2
181	A7	307542	4668994	Friday	3
182	B6	301700	4678934	Wednesday	3
183	B6	301698	4681063	Wednesday	3
184	B6	300531	4681640	Wednesday	3

185	B6	299519	4676720	Wednesday	3
186	B7	303412	4673999	ThursFri	3
187	E7	278837	4670319	Tuesday	3
188	E7	279893	4670073	Tuesday	3
189	E7	283662	4670666	Tuesday	3
190	F4	272046	4691878	Monday	3
191	F4	276187	4690073	Wednesday	3
192	F4	276612	4689165	Wednesday	3
193	F6	276813	4674409	Tuesday	3
194	G3	265070	4699898	Monday	3
195	G3	268254	4697801	Monday	3
196	G3	267240	4695874	Monday	3
197	G3	269154	4700099	Monday	3
198	G4	268941	4693176	Monday	3
199	G5	261529	4684481	Monday	3

2011 Detection histories for a study of black bears in southern New York.

i = Identifying number for each unique individual
k = Sampling week in which the individual was detected (1-10), from June 7 - August 20, 2011
day = Day from Monday to Saturday (M,T,W,R,F,S) during the sampling week that the individual was detected. Not included in the detection history for the model, but included here for reference
j = hair snare location where the individual was detected
T = part of the identification of the barb(s) from which hair samples of the individual were collected; tree to the immediate left of the barbs on which the sample was collected
barb = The number of the barb(s) to the adjacent to tree *T,* on which hair samples were collected; multiple barbs indicate pooled samples
sex = Sex of the individual. 0, 1, and NA denote female, male, and unknown, respectively.

i	k	day	j	T	barb	sex
1	1	F	85	T6	33	NA
1	5	R	72	T1	24+25+26	NA
1	4	R	72	T7	33	NA
1	4	R	73	T6	21	NA
1	5	R	73	T1	11	NA
1	8		157	T4	15	NA
2	1	M	23	T4	5	NA
2	4	M	23	T4+6	6+18	NA
2	5	M	23	T6	4+7	NA
2	7	W	150	T1	16	NA
2	8	W	150	T2	32	NA
2	8		134	T1	23	NA
3	1	M	23	T2	9	NA

4	1	R	68	T3.1-5	-	1
5	5	R	60	T4	22	1
5	4	R	60	T4	23+lots	1
5	4	R	72	T7	21	1
5	4	R	73	T1	11	1
5	1	S	62	T3	9	1
6	2	F	80	T8	1	1
7	2	F	87	T2	4	1
7	5	F	87	T1	42	1
7	5	F	85	T1	5+6+28	1
7	4	F	87	T4	32	1
8	2	R	70	T4	28	0
9	4	T	53	T1	51	0
9	6	T	155	T7	13	0
9	3	T	53	T4	85	0
9	5	T	53	T2	23	0
9	4	W	54	T7	2	0
9	5	W	54	T7	21	0
9	4	W	65	T4	39+44+46	0
9	2	W	54	T4	18	0
10	3	F	80	T5	26+27	NA
11	3	F	85	T4	21	0
12	10	F	208	T1	6	NA
12	3	F	91	T6	15	NA
13	3	F	97	T5	13	1
14	3	F	85	T6	14+16	NA
15	3	R	76	T1	35+37+40+42	NA
15	7	R	214	T3	33	NA
16	6	F	131	T4	20	0
16	3	R	60	T4	34	0
16	5	W	64	T4	24	0
17	3	R	69	T6	11	0
18	3	R	69	T7	115	0
18	6	R	168	T6	5	0
19	9	W	131	T4	29	1
19	10	W	130	T2	17	1
19	3	R	72	T3	20	1
19	4	R	73	T2	14	1
20	3	R	73	T4	24	NA
21	3	S	2	Gazebo	-	NA
22	3	S	2	T2	6	NA
23	3	S	2	T4	13	NA
24	3	T	21	T4	25	1

24	4	T	21	T5	20+21+22	1
25	9	R	148	T5	50	NA
25	10	R	148	T5	37	NA
25	7	R	148	T5	37+38	NA
25	3	T	49	T8	59	NA
25	4	T	49	T4	12	NA
26	3	T	53	T4	10	0
27	3	T	59	T1	24	NA
28	3	W	64	T8	25	NA
29	4	W	57	T5	22+26	NA
30	4	F	87	T1+1+2	17+23+19	NA
31	4	M	26	T4+1	17+18	NA
31	5	M	26	T5+6+7	29+15+8	NA
32	4	M	28	T1+5	7+14	NA
33	4	R	72	T1	4+5+6	NA
34	5	R	184	T4	4	1
34	4	R	184	T1	13	1
35	4	R	68	T4	3	NA
36	4	R	73	T1	14	NA
37	4	R	48	T3	6	NA
38	9	F	178	Trub	-	NA
38	4	T	49	T1	4+5+6	NA
39	9	?	140	T3+5+5	25+8+30	0
39	4	W	57	T5	23	0
39	5	W	57	T5	26	0
40	5	F	96	T1	48	0
40	7	T	154	T1	12	0
41	5	F	97	T5	5	1
42	5	F	90	T7	10	NA
43	5	F	90	T1	16	NA
44	5	F	85	Tunknown	unknown	NA
45	5	F	87	T1+4	41+15	NA
46	5	F	97	T6	3	NA
47	5	M	5	T1	6+11	NA
48	5	M	5	T5	9	NA
49	5	M	13	T4+2	53+5	NA
50	5	M	26	T2	15+16	NA
50	7	W	121	T5	31	NA
50	8	W	121	T2	45	NA
51	5	R	68	T3	8	1
52	9	R	184	T4	19	1
52	5	R	69	T2	52	1
52	7	R	184	T5	36	1

53	5	R	68	T1+3+3	30+6+9	NA
54	5	R	165	T1+1+4	4+6+37	NA
54	5	W	163	T4	25	NA
54	7	W	165	T1	31	NA
55	5	R	48	T4	0	NA
56	5	R	60	T1	18+lots	NA
57	5	R	70	T3	26+27+28	NA
58	5	T	1	T3	20	NA
59	5	T	53	T4+5+5	10+23+32	NA
60	6		161	T4	5	NA
61	6	F	216	T4	12	0
61	8	F	216	T1	19	0
62	6	F	180	T4	32	1
63	6	F	178	T5	23	NA
64	6	M	100	T2	3	1
65	6	M	102	T6	14	1
65	7	M	102	T1	28+29	1
66	6	M	108	T4	6	1
66	8	M	109	T1	9	1
67	10	R	168	T6	10	1
67	7	F	186	T6	4	1
67	6	R	168	T1	11	1
67	7	R	168	T2	13	1
67	7	R	169	T2	14	1
67	8	W	166	T7	8	1
68	6	R	212	T4	16	1
68	7	R	212	T2	37	1
69	6	R	212	T4	17	NA
70	10	W	130	T1	48+50	0
70	6	T	131	Center	-	0
70	7	T	131	Center	-	0
70	7	W	130	T2	8	0
70	8	W	131	Ttree	-	0
71	6	T	172	T5	13+14	NA
71	7	T	172	T1+2	15+34	NA
72	6	T	133	T2	unknown	NA
72	7	T	136	T1	3	NA
73	9	W	130	T6	14	NA
73	6	T	133	T2	17+22	NA
73	7	T	133	T7	7+8	NA
74	6	T	133	T2	31+33	NA
75	6	T	133	T3	15+16+21	NA
76	6	T	133	T3	39	NA

77	6	T	133	T4	39+40+41	NA
77	7	T	134	Tunknown	unknown	NA
78	6	T	156	T1+1+2	8+11+32	NA
78	7	T	156	T1	35	NA
79	6	T	156	T6	12	NA
80	9	?	136	T2	46	NA
80	9	?	155	T11	8	NA
80	6	T	156	T7	4	NA
80	8	?	155	T7	5	NA
81	6	T	140	T5+6	7+44	NA
82	7	F	217	T1	19+20	NA
83	7	F	217	T6	4	1
84	7	F	210	T1	26	1
85	7	F	202	T3	2	0
86	7	F	219	T5	6+7	1
87	7	M	127	T5	2	NA
88	8	F	206	T3	10	NA
88	7	M	108	T5	25	NA
89	7	M	112	T2	3	NA
90	7	M	112	T7+8	4+36	NA
91	7	M	113	T3	24	NA
92	7	R	183	T8	22	1
93	7	R	184	T2	13	1
94	7	R	188	T2	7	0
95	7	R	188	T6	13	0
96	8	R	190	T5	9	1
96	7	R	190	T5	3	1
97	7	R	213	T2	13	NA
98	7	R	213	T3	10	1
99	7	S	144	T5	28	0
100	7	T	134	T3	44+45	NA
101	9	W	150	T4	24	NA
101	10	W	151	T2	27	NA
101	7	T	151	T2	9	NA
102	7	T	139	T1+1+6	4+6+15	NA
103	7	T	137	T4	15	NA
104	7	W	123	T2	12	1
105	7	W	135	T5	12	0
105	7	W	150	T8	16	0
106	9	W	162	T2	40	0
106	10	W	162	T4	10	0
106	7	W	162	T1	4	0
107	7	W	130	T2	17+18+19	0

108	8	T	172	T3	3	NA
109	8	?	155	T3	28	NA
110	8	F	181	T3	17	1
111	8	M	106	T2	41	1
112	8	M	127	T1	22	0
113	8	M	113	T6	27	NA
114	9	R	212	T5	7	NA
114	8	R	213	T1	20	NA
114	8	R	214	T6	2&3	NA
115	8	R	148	Tbucket	-	NA
116	8	R	148	T4	30	NA
117	8	R	148	T5	53	NA
118	8	S	144	T5	23	0
119	8	S	178	T4	14	NA
120	8	W	195	T6	3	NA
121	10	W	151	T7	16	0
121	8	W	150	T4	9	0
121	8	W	151	T3	6	0
122	8	W	164	T6	11	1
123	8	W	166	T2	10	1
124	8	W	123	T1	8	NA
125	8	W	123	T4	14	NA
126	9	?	134	T1	0	NA
126	10	?	133	T2	33+32	NA
126	10	?	134	T1+1+3+4	6+62+11+38	NA
127	9	?	138	T3	25+26	NA
128	9	?	156	T2	5	NA
128	10	?	139	T1+1+5+5	10+11+13+24	NA
129	9	F	201	T5	26	0
130	9	F	178	T9	4+5+6	NA
131	9	F	178	T9	9+11	0
132	9	M	128	T4	3+6	NA
132	10	M	103	Tunknown	unknown	NA
133	9	M	103	T5	20+8	NA
134	9	M	127	T6	8	NA
135	9	R	148	T3	32	NA
136	9	R	148	T4	15	NA
137	9	R	144	T1	4	NA
138	9	W	187	T4	26	NA
139	9	W	122	T6	27+28	NA
140	10	T	170	T3	6	NA
141	10	T	155	T2	15	NA
142	10	T	136	T1	23	NA

143	10	T	138	T1	23	NA
144	10	?	156	T2	23+24	NA
145	10	F	217	T1	20	1
146	10	F	217	T7	12	0
147	10	F	208	T2	13	NA
148	10	F	178	T5	2	0
149	10	F	179	T3	21	NA
150	10	M	109	T6	13	0
151	10	M	128	T1	50	0
152	10	M	102	T2	16	NA
153	10	M	114	T2+4+4	11+21+22	NA
154	10	M	126	T3+5	26+69	NA
155	10	R	144	T4	16	NA
156	10	S	144	T2	19+20	NA
157	10	W	130	T2	32	0
158	10	W	165	T1	28	NA
159	10	W	162	T5	9+11	NA

2012 Detection histories for a study of black bears in southern New York.

i = Identifying number for each unique individual
k = Sampling week in which the individual was detected (1-10), from June 4 - August 10, 2012
day = Day from Monday to Saturday (M,T,W,R,F,S) during the sampling week that the individual was detected. Not included in the detection history for the model, but included here for reference
j = hair snare location where the individual was detected
T = part of the identification of the barb(s) from which hair samples of the individual were collected; tree to the immediate left of the barbs on which the sample was collected
barb = The number of the barb(s) to the adjacent to tree *T,* on which hair samples were collected; multiple barbs indicate pooled samples
sex = Sex of the individual. 0, 1, and NA denote female, male, and unknown, respectively.

i	**k**	**day**	**j**	**T**	**barb**
1	1	F	15	T3	39T
1	10	R	111	T4	23T
1	3	W	28	T2	11T
1	4	W	28	T5	22T
1	5	W	28	T2	11+13B
1	7	R	111	T7	36T
2	1	F	15	T4	47T
2	3	F	15	T4	1617T
2	4	W	28	T3	48T
3	1	F	16	T6	38+39T
4	1	F	30	T3	10+11B

4	2	F	30	T2	1+2T
4	3	F	30	T2	12T
4	4	F	30	T1	13B
4	5	F	30	T1	4+6B
5	1	M	51	T1	3T
5	10	W	125	T3	14T
5	10	W	128	T8	4T
5	4	T	62	T5	56T
5	7	R	110	T3	45T
6	1	M	198	T1	11B
7	1	M	198	T4	28T
7	2	M	190	T8	177B
7	4	M	190	T4	13B
7	5	M	190	T8	22B
8	1	M	65	T1	16B
8	3	M	63	T1	10T
9	1	M	65	T2	10T
9	3	M	63	T1	17B
9	4	M	63	T1	20B
9	4	M	64	T1	1920T
9	4	M	65	T4	12B
9	4	M	195	T1	034T
9	5	M	63	T2	12B
9	5	M	64	T1	23B
9	5	M	65	T1	15B
9	6	T	178	T6	34B
10	1	M	65	T2	21T
10	3	M	63	T3	19B
10	4	M	63	T1	18B
10	4	M	65	T1	36B
11	1	M	65	T2	24B
11	3	M	63	T2	26B
11	5	M	63	T4	33+34B
11	5	M	65	T4	1+2B
12	1	R	34	T4	57T
12	2	R	34	T2	15B
12	3	W	26	T1	31+32+33B
12	4	W	26	T1	3233T
12	5	W	25	T3	3B
12	8	R	112	T1	22B
13	1	T	54	T2	5B
14	1	T	188	T1	27B
14	4	T	188	T3	8T

14	5	T	188	T3	38B
14	6	T	188	T5	12B
14	7	T	188	T4	9B
14	8	T	188	T4	8B
15	1	W	184	T4	15B
16	1	W	183	T4	4T
16	1	W	185	T5	15T
16	2	W	182	T6	20B
16	5	W	183	T2	2+4T
16	6	W	184	T4	21+25+26B
16	8	W	184	T5	13B
17	1	W	25	T3	27T
17	1	W	27	T6	10B
17	3	W	25	T2	21+22B
17	3	W	26	T2	14+15T
17	3	W	27	T1	13B
17	4	W	25	T4	151617T
17	4	W	26	T2	45T
17	4	W	27	T6	1415T
17	5	W	25	T2	22B
17	5	W	26	T1	6T
17	5	W	27	T1	3+4T
17	6	R	102	T3	9+8T+B
18	1	W	24	T1	11B
18	3	W	24	T1	2+10+11T+B+B
18	5	W	22	T4	3+4T
19	1	W	27	T1	13B
20	1	W	185	T5	14B
20	3	W	185	T3	15T
20	5	W	185	T5	15B
21	2	F	1	T6	8B
22	2	F	57	T6	12B
22	3	R	12	T4	0T
23	2	F	16	T4	9B
23	2	F	17	T2	33T
23	3	F	16	T7	6B
24	2	F	16	T5	16+17T
24	2	F	17	T2	30+31T
25	2	F	16	T7	42+43+44B
26	2	F	47	T1	20+21B
27	2	F	30	T5	19+21B
28	2	F	80	T4	26B
29	2	M	195	T1	18T

29	5	M	197	T5	9B
29	6	M	195	T6	26B
29	8	M	157	T5	25+29T
30	10	M	173	T1	0B
30	2	M	195	T5	11B
30	2	M	196	T1	27B
30	3	M	195	T3	20B
30	5	M	196	T6	12B
30	6	M	171	T3	29+30T
30	9	M	171	T1	11T
31	2	M	196	T5	6B
31	3	M	195	T5	lots+2T
31	4	M	195	T6	2lots2T
32	2	M	197	T7	3B
33	2	M	190	T7	13B
33	4	M	190	T4	13B
33	4	M	197	T6	2529T
34	2	M	65	T	9B
34	9	W	124	T4	8T
35	2	M	75	T1	26B
36	2	M	75	T1	6T
36	5	M	76	T4	13B
37	10	T	175	T1	19T
37	10	T	176	T3	13+15B
37	10	T	178	T4	13B
37	2	M	75	T2	61B
37	4	M	65	T2	2526T
37	4	M	74	T3	34B
37	4	M	75	T3	10B
37	4	M	76	T1	5254B
37	5	M	64	T2	4T
37	5	M	74	T3	33B
37	6	T	175	T3	17B
37	7	T	176	T6	3B
37	8	T	175	T1	13B
37	8	T	178	T3	16B
38	2	R	12	T3	28B
39	2	R	21	T2	4+6B
39	3	R	20	T1+4+5	6+18+24T
39	3	R	21	T2	25T
39	4	R	20	T3	3T
39	4	R	21	T2	1B
39	5	R	20	T5+6+6	22+29+30T

39	5	R	21	T3	5B
40	2	T	54	T3	26+27B
40	3	T	53	T2+2+4	25+17+57B
40	4	T	48	T6	47B
40	4	T	53	T3	6B
40	5	T	48	T4	57+58T
40	5	T	53	T1	2+3B
40	6	W	139	Tbait	-
40	7	W	139	T7	37+38+39B
40	7	T	153	T3	16B
40	7	T	156	T4	36B
40	8	F	93	T3	29T
40	8	W	139	T3	21T
41	2	T	55	T7	10B
41	3	T	54	T6	17B
41	4	T	55	T7	89B
41	5	T	54	T5	12B
41	5	T	55	T6	9B
41	6	M	164	T1	10T
42	2	T	188	T1	14T
43	2	T	49	T2	12+14B
44	2	T	49	T3	41B
45	2	W	183	T1	19+21T
45	3	W	183	T6	8T
46	2	W	192	T4	36+37+38B
47	2	W	25	T3	14T
47	2	W	26	T2	2T
48	2	W	25	T7	8B
48	2	W	26	T2	4T
49	2	W	26	T2	5+7T
50	2	W	32	T1	11B
50	3	W	32	T1	33+34B
51	2	W	56	T3	5B
51	4	T	56	T1	18T
52	2	W	56	T3	8B
52	3	T	56	T2	5+8+9T
52	4	T	56	T1	8B
52	5	T	56	T1	26T
53	10	F	181	T5	2T
53	3	F	10	T1	2021B
53	5	F	181	T4	10+11B
53	6	R	105	T4	22T
53	6	F	181	T5	17B

53	7	R	106	T3	38B
53	7	F	181	T6	24B
54	3	F	10	T1	23B
54	4	F	10	T1	24B
54	5	R	11	T4	44T
54	6	F	181	T4	1T
55	3	F	15	T1	16T
55	4	F	15	T3	6B
55	5	F	15	T1	29+30T
55	5	F	16	T3	4+5B
55	5	F	17	T4	10B
55	7	R	103	T6	8B
56	3	F	16	T4	15B
57	3	F	46	T3	6T
57	4	W	45	T1	1213B
57	4	F	46	T1	n1T
57	5	W	44	T2	9T
57	5	W	45	T3	10+11B
57	5	F	46	T3	24B
57	6	T	153	T3	16B
57	6	T	155	T2	15B
57	7	T	155	T6	17T
57	8	T	155	T3	28+31+39+57T
57	9	T	153	T4	16T
58	3	F	30	T4	171820B
58	7	R	107	T6	38B
59	10	M	190	T?	unknown
59	3	M	196	T6	20+21B
59	3	M	198	T1	unknown+14B
59	4	M	196	T1	25B
59	6	T	149	T5	4+5B
59	6	T	151	T7	12B
59	6	M	172	T2	21B
59	8	M	149	T4+5	3+25T
59	8	M	198	T3	46T
60	3	M	194	T2	12B
60	4	M	194	T2	78B
61	3	M	194	T2	14+16B
62	3	M	194	T2	15+16T
63	3	M	194	T2	2B
64	3	M	196	T6	11+12B
65	10	T	188	T4	7B
65	3	M	63	T?	3?T

65	3	T	187	T2	10B
65	4	T	188	T4	34B
65	5	T	188	T2	15B
65	6	T	188	T2	21+22B
65	7	T	187	T3	53B
65	8	T	188	T5	6B
65	9	T	188	T1	7T
66	3	M	63	T1	18T
67	3	M	65	T3	23T
68	3	M	65	T4	8T
69	3	R	184	T1	17+18B
70	3	R	184	T3	13T
71	3	R	184	T6	15T
71	5	W	184	T4	31B
71	8	W	183	T4	6B
71	8	W	184	T?	13T
72	3	R	9	T1	20B
72	4	R	9	T1	9B
72	5	R	9	T7+6	25+3T+B
73	10	R	133	T1	nT
73	3	R	34	T4	14T
73	4	W	25	T3	23+24T
73	4	W	26	T1	25T
73	4	R	31	T5	25+26T
73	5	R	31	T2	7+8T
73	6	W	132	T6	10+16+17+16T+T+T+B
73	6	T	189	T6	8+9T
73	7	R	114	T3	37T
73	8	F	87	T3	12B
73	8	R	103	T4	25T
73	8	R	112	T1	43T
73	8	W	138	T1	30T
74	10	M	165	T1	20T
74	3	T	54	T1	31B
74	4	T	54	T1	44B
74	4	T	55	T1	24+26B
74	5	T	54	T3	9B
74	6	M	164	Tbait	-
74	6	W	133	T8	17T
74	8	M	164	T3	12+13T
75	3	T	49	T1	20B
75	3	T	188	T3	39T
75	4	T	49	T5	5T

75	4	T	188	T3	18T
75	5	T	49	T1	21+22B
76	3	T	37	T5	15B
76	5	T	51	T2	12B
77	10	T	189	T3	29+30T
77	3	T	189	T5	6+9B
77	4	T	189	T4	40T
77	5	T	53	T3	8+16B
77	7	T	189	T3	57B
77	8	T	189	T4	8B
77	9	T	189	T3	51B
78	3	W	45	T1	2B
79	3	W	45	T3	18T
80	3	W	27	T4	18+19B
80	4	W	27	T6	33+34T
81	10	W	126	T5	18B
81	3	W	32	T1	35T
81	4	W	22	T3	14+15+17B
81	4	W	28	T5	4B
81	5	W	32	T6	16T
81	5	W	33	T3	30B
81	9	W	126	T4	1T
82	3	W	33	T6	41T
82	5	W	23	T5	27T
82	9		151	Trub1	-
83	10	W	185	T1	48+51T
83	3	W	185	T4	10T
83	4	W	185	T2	10T
83	6	W	185	T?	39T
83	7	W	185	T2	7T
83	9	W	185	T1	34T
84	4	F	1	T6	18T
85	4	F	10	T7	13B
85	5	F	10	T?	?B
85	7	R	83	T2	21B
85	8	R	105	T2+unknown	26+16T
85	9	R	83	T4	36+37T
86	4	F	35	T3	20+21B
86	4	R	36	T1	32T
86	5	R	36	T2	42T
87	4	F	6	T2	7B
87	5	F	6	T1	25T
87	6	F	84	T5	16T

88	4	M	195	T1	4B
89	4	M	194	T3	10T
90	4	M	194	T3	5B
90	5	M	194	T6	7B
91	4	M	69	T2	6T
91	5	M	71	T1	10T
91	6	M	173	T4	26B
91	8	M	173	T4	24T
92	4	M	69	T6	12B
92	5	M	69	T3	18B
93	4	M	79	T6	21T
93	5	M	79	T2	7+8T
94	4	M	73	T5	25T
95	4	M	73	T5	47T
96	4	M	70	T1	12B
96	5	M	195	T3	4T
97	4	R	186	T5	15B
98	4	R	14	T3	5T
99	4	R	11	T1	10+11B
100	4	R	34	T6	37B
101	10	T	144	T8	5B
101	10	T	145	T1	7B
101	4	T	51	T1	9B
101	5	F	40	T1	71T
101	5	T	37	T1+2	36+6T
102	10	T	145	T4	13B
102	4	T	51	T3	25B
102	7	T	145	T4	11B
103	4	T	55	T1	11B
104	10	T	187	T5	nB
104	4	T	62	T1	3+9+10T
104	5	T	187	T1+4+5	9+16+26+29B
104	7	T	187	T2	9B
104	8	T	188	T4	28B
104	9	T	187	T3	57+60T
105	4	T	62	T4	13T
106	4	T	187	T3	27+35B
107	4	T	187	T3	59+60B
107	5	W	183	T5	11B
107	5	T	193	T5	16B
107	6	T	189	T5	11B
107	7	T	188	T2	34B
108	4	T	188	T4	11+12B

109	4	T	37	T8	3B
109	5	T	38	T2	19T
110	10	F	155	T4	6T
110	4	W	183	T2	23+24B
110	4	W	184	T4	9B
110	6	W	183	T3	3T
110	7	W	184	T3	5T
110	9	W	183	T2	14T
111	4	W	32	T5	57T
111	6	W	123	T5	18T
111	7	W	123	T2	22T
112	10	W	126	T1	22+24T
112	4	W	33	T5	31+32+34T
112	6	W	126	T6	34T
113	10	W	139	T1	nnT
113	10	W	140	T5	9B
113	4	W	28	T8	34B
113	5	F	47	T5+5+6	14+15+0T
113	6	W	139	T2	12B
113	7	W	139	T4	23+24B
114	5	F	15	T1	24T
115	5	F	11	T4	27B
116	5	T	62	T6	12B
117	10	T	187	T3	nn+nn+1B
117	10	T	188	T5	14B
117	5	T	187	T3	16B
117	8	T	188	T2	7B
117	8	T	189	T5	9B
118	5	T	48	T5	3B
119	5	W	184	T5	15B
120	5	W	192	T7	4T
121	5	W	191	T2	20B
121	6	W	192	T5	40B
121	7	T	193	T1	15B
121	9	T	142	T2	15+16B
122	5	W	25	T3	28T
122	5	W	26	T3	38T
122	8	W	136	T5	5B
123	6	F	181	T5	16B
124	6	M	179	T1	8T
125	6	M	177	T2+3	24+3T
125	7	M	177	T5	17B
125	8	M	177	T4	6B

126	6	M	177	Twire	-
126	8	M	177	T3	7T
127	6	R	106	T2	4B
128	10	W	138	T2	36T
128	6	W	137	T8	20B
128	6	W	138	T1	5T
128	7	W	138	T2	28T
128	8	W	138	T1	3T
128	9	W	138	T2	25T
129	6	W	125	T4	17+19B
129	7	W	124	T5+6	3+3T
130	10	W	134	T1	unknown
130	6	W	135	T2	24+5T+B
130	7	W	134	T1	33T
130	7	W	135	T4	32T
131	6	W	133	T7	5T
132	6	W	185	T2	4T
133	10	R	130	T1	?B
133	7	R	130	T3	20T
134	7	R	110	T3	1T
135	7	T	188	T2	33+34T
136	7	T	146	T1	3B
136	9	T	146	T4	25+baitT
137	10	W	137	T7	18B
137	10	T	153	T2	3B
137	7	T	155	T5	11B
137	9	W	139	T4	15B
137	9	T	153	T2	4B
138	10	T	142	T1	n+2B
138	6	T	142	T4	0+2T
138	7	T	142	T1	64B
139	7	W	184	T1	4T
139	8	W	184	T3	n+1B
139	9	W	183	T4	15T
140	7	W	125	T5	4B
140	9	R	127	T1	11+12T
141	7	W	140	Tbait	-
142	8	F	99	T1	35T
143	8	R	101	T5	34B
143	9	R	102	T5	NT
144	8	R	112	T1	19B
145	8	R	113	T4	12B
146	10	R	112	T1	59B

146	10	R	114	T1	4+5B
146	8	R	114	T1	16+17B
146	9	R	112	T3	45+46B
147	8	T	178	T4	19B
148	8	W	138	T1	12+18+26T
149	8	W	138	T1	4T
150	9	F	93	T5	6B
151	9	F	92	T2	46T
152	9	M	164	T2	26+57B+T
153	9	M	177	T2	26T
154	9	M	177	T5	9T
155	9	R	101	T6	23B
156	9	R	110	T2	6T
157	9	R	133	T1	26T
158	9	T	149	T8	9T
159	9	W	125	T1	26+37T
160	9	W	132	T4	2T
161	9	W	123	T7	18+19+20T
162	10	F	92	T2	47+48B
163	10	M	164	T2	23B
164	10	M	166	T1	9T
165	10	M	196	T1	unknown
166	10	M	177	T4+3	7+47T
167	10	W	138	T3	22+23T
168	10	W	135	T4	unknown
169	10	W	136	T1	30T

Covariates on population density and/or detection probability for a black bear study in southern New York.

Pixel = Landscape pixel
Easting, Northing = UTM Zone 18 N coordinates of pixel, divided by 1000.
Latitude = Difference in latitude against the mean in the study area; a covariate on density
Forest = Standardized % forest landcover type; covariate on density and detection
Forest2 = Standardized % forest landcover type squared; covariate on density
Ag = Standardized % agricultural landcover type; covariate on density and detection
Shrub = Standardized % shrub and grassland landcover type; covariate on density and detection
Road = Standardized road density; covariate on density and detection
TPI = Topographic Position Index calculated as the standardized elevation; covariate on density and detection

Pixel	Easting	Northing	Latitude	Forest	Forest2	Ag	Shrub	Road	TPI
1	258.8292	4662.887	-25.0945	-0.6368	-0.767	0.2435	0.1181	-1.6174	-0.0934
2	259.852	4662.868	-25.1135	0.156	-0.0577	-0.1318	-0.2824	-1.1013	-0.5446
3	260.8748	4662.849	-25.1324	0.256	0.0513	-0.3064	0.4141	-0.3626	-0.1599
4	261.8976	4662.83	-25.1514	0.4077	0.225	-0.4848	0.3618	-0.3324	-0.3566
5	262.9204	4662.811	-25.1703	0.1836	-0.0281	0.0131	-0.8919	-0.8143	-0.6889
6	263.9432	4662.792	-25.1893	0.5145	0.3534	-0.3807	0.2748	-1.1183	0.2134
7	264.966	4662.773	-25.2083	-1.0849	-1.046	1.3247	-0.1605	-1.2631	-0.3896
8	265.9888	4662.754	-25.2272	0.4939	0.3282	-0.3176	-0.3521	-1.2415	-0.104
9	267.0116	4662.735	-25.2462	0.7007	0.5892	-0.5033	-0.6307	-1.2088	-0.6458
10	268.0344	4662.716	-25.2651	-1.0987	-1.0532	0.8528	1.6852	-1.0969	-0.6005
11	269.0572	4662.697	-25.2841	-0.0749	-0.2928	0.1134	0.8842	-0.8569	-0.5109
12	270.08	4662.678	-25.3031	-0.4541	-0.628	0.0243	2.8692	-0.929	0.2786
13	271.1028	4662.659	-25.322	-0.4127	-0.5945	0.7636	-0.4391	-0.9095	0.0006
14	272.1256	4662.64	-25.341	-1.2848	-1.1421	1.1983	1.2847	-0.9607	0.2714
15	273.1484	4662.621	-25.3599	-0.8919	-0.9366	1.0571	0.0484	-0.8781	0.0073
16	274.1711	4662.602	-25.3789	0.5559	0.4045	-0.3807	-0.265	-0.618	-0.0338
17	275.1939	4662.583	-25.3978	0.5214	0.3619	-0.9789	-0.4914	-0.2216	-0.5792
18	276.2167	4662.564	-25.4168	1.397	1.6056	-1.1647	-0.6133	-0.2232	0.6379
19	277.2394	4662.545	-25.4358	1.6038	1.9485	-1.4359	-0.6307	-0.5778	-0.0133

20	278.2622	4662.526	-25.4547	1.1867	1.2763	-1.4025	-0.0561	-0.6413	-0.4523
21	279.285	4662.507	-25.4737	-0.2852	-0.4865	-0.0501	1.0235	-0.7194	-0.5222
22	280.3077	4662.488	-25.4926	1.1626	1.2397	-1.4173	0.0484	-0.8377	-0.145
23	281.3305	4662.47	-25.5116	-0.6299	-0.762	0.9531	-0.1954	-1.0119	0.5995
24	282.3532	4662.451	-25.5305	-1.3745	-1.1794	1.8151	-0.8919	-0.997	0.5594
25	283.376	4662.432	-25.5495	-1.5709	-1.2491	1.8039	-0.5958	-0.5603	0.5647
26	284.3987	4662.413	-25.5684	-0.4886	-0.6553	0.6819	-0.3347	-0.7252	0.1888
27	285.4215	4662.394	-25.5874	-1.5916	-1.2554	1.9488	-0.5088	-0.9001	-0.3025
28	286.4442	4662.375	-25.6064	-0.6127	-0.7495	0.6262	1.1454	-1.079	0.5065
29	287.4669	4662.356	-25.6253	-0.4127	-0.5945	0.236	1.4762	-1.2967	-0.6583
30	288.4896	4662.337	-25.6443	-0.492	-0.658	0.9011	-0.6481	-1.1904	0.6818
31	289.5124	4662.318	-25.6632	-1.4985	-1.2254	1.4696	0.7623	-1.2925	-0.4786
32	290.5351	4662.299	-25.6822	0.1354	-0.0797	-0.3844	2.0856	-1.1002	-0.1101
33	291.5578	4662.28	-25.7011	-0.6402	-0.7695	0.9383	-0.1605	-1.0421	0.6331
34	292.5805	4662.261	-25.7201	-1.2159	-1.1109	1.5624	-0.857	-1.269	-0.3148
35	293.6032	4662.242	-25.739	-1.4193	-1.1968	1.8151	-0.857	-1.4099	-0.4193
36	294.6259	4662.223	-25.758	-1.895	-1.3269	2.2907	-0.857	-1.9535	-0.0641
37	295.6487	4662.204	-25.777	0.1905	-0.0206	-0.3584	1.7896	-2.0731	0.2505
38	296.6714	4662.185	-25.7959	0.4835	0.3156	-0.4067	0.5185	-1.8267	0.535
39	297.6941	4662.166	-25.8149	-0.4162	-0.5973	0.3141	1.1628	-1.5779	0.3239
40	298.7167	4662.147	-25.8338	-0.0715	-0.2895	0.3735	-0.7177	-1.2916	0.4221
41	299.7394	4662.128	-25.8528	-0.0267	-0.2456	0.1543	-0.5958	-1.0552	0.1047
42	300.7621	4662.109	-25.8717	-0.7367	-0.8369	0.2323	0.031	-1.002	-0.2632
43	301.7848	4662.09	-25.8907	-0.5472	-0.7006	0.8342	-0.2476	-1.2588	0.3009
44	302.8075	4662.071	-25.9096	0.0044	-0.2147	-0.1467	1.7026	-1.7185	0.7072
45	303.8302	4662.053	-25.9286	-0.3886	-0.5746	0.6633	-0.0735	-1.8814	0.1106
46	304.8528	4662.034	-25.9475	-1.3021	-1.1495	1.3098	-0.7874	-1.8647	-0.5646
47	305.8755	4662.015	-25.9665	-0.4437	-0.6197	0.3029	-0.8919	-1.6757	-0.5127
48	306.8982	4661.996	-25.9854	0.2974	0.0976	-0.1504	-0.4914	-1.5869	0.4765
49	307.9208	4661.977	-26.0044	1.6142	1.9661	-1.3765	-0.5436	-1.6731	0.31
50	308.9435	4661.958	-26.0233	1.5107	1.7918	-1.2501	-0.857	-1.4441	-0.3085

51	309.9662	4661.939	-26.0423	1.0902	1.1316	-0.8637	-0.7526	-1.5029	0.0095
52	258.8481	4663.909	-24.0717	-0.3714	-0.5602	0.106	0.6753	-0.875	-0.0812
53	259.8709	4663.89	-24.0906	0.0147	-0.2044	0.1952	-0.0735	-0.1671	-0.1449
54	260.8938	4663.872	-24.1096	0.6421	0.5133	-0.4848	0.0832	0.6153	-0.0508
55	261.9166	4663.853	-24.1286	0.7455	0.6482	-0.6408	0.2748	0.623	0.6231
56	262.9394	4663.834	-24.1475	1.3729	1.5668	-1.1907	-0.2128	0.1961	-0.0792
57	263.9622	4663.815	-24.1665	0.4732	0.3031	-0.2433	-0.561	-0.3742	-0.4049
58	264.985	4663.796	-24.1855	1.2936	1.4412	-0.9566	-0.8744	-0.1805	-0.0387
59	266.0078	4663.777	-24.2044	-0.7402	-0.8392	1.1983	-0.7177	-0.3526	0.3279
60	267.0306	4663.758	-24.2234	-0.3369	-0.5311	0.6522	-0.265	-0.5375	0.5344
61	268.0534	4663.739	-24.2423	-0.8333	-0.9002	1.0534	0.3792	-0.6347	0.5309
62	269.0762	4663.72	-24.2613	-1.1021	-1.055	1.2503	0.2051	-0.4709	0.459
63	270.099	4663.701	-24.2803	-0.7816	-0.8668	0.4924	1.4414	-0.3956	-0.6917
64	271.1218	4663.682	-24.2992	-0.006	-0.2251	0.1246	-0.0909	-0.2815	-0.0605
65	272.1445	4663.663	-24.3182	-0.4093	-0.5917	0.3252	1.0235	-0.378	0.6161
66	273.1673	4663.644	-24.3371	-0.5334	-0.6901	0.2955	1.9289	-0.1129	0.4877
67	274.1901	4663.625	-24.3561	-0.3059	-0.5045	0.4404	-0.0735	0.1352	-0.0937
68	275.2129	4663.606	-24.3751	-0.6575	-0.7818	0.6373	0.536	0.5717	0.25
69	276.2356	4663.587	-24.394	0.8903	0.8449	-1.3802	0.7971	0.4958	-0.5594
70	277.2584	4663.568	-24.413	0.549	0.396	-0.7151	0.9364	0.257	-0.1948
71	278.2812	4663.549	-24.432	-0.7023	-0.8133	0.8045	0.0832	-0.1504	0.6629
72	279.3039	4663.53	-24.4509	-0.7471	-0.8438	0.8714	-0.3695	-0.0835	0.4711
73	280.3267	4663.511	-24.4699	0.7834	0.6988	-1.0606	0.6404	-0.2003	-0.659
74	281.3494	4663.492	-24.4888	-0.8643	-0.9196	1.1909	-0.8744	-0.4412	-0.2616
75	282.3722	4663.473	-24.5078	-1.8915	-1.3263	2.2461	-0.7874	-0.4404	0.4219
76	283.3949	4663.454	-24.5267	-1.6123	-1.2616	1.8114	-0.474	0.0615	-0.4307
77	284.4177	4663.435	-24.5457	-1.8846	-1.3251	2.0157	-0.7351	-0.2344	0.308
78	285.4404	4663.416	-24.5647	-1.4537	-1.2096	1.7594	-0.857	-0.4637	0.5437
79	286.4631	4663.397	-24.5836	-0.9022	-0.9429	1.2429	-0.7003	-0.5467	-0.1694
80	287.4859	4663.379	-24.6026	-0.2921	-0.4925	0.2732	0.0658	-0.6507	-0.4307
81	288.5086	4663.36	-24.6215	-0.7333	-0.8345	1.0794	-0.7177	-0.7625	0.6097

82	289.5313	4663.341	-24.6405	-1.2159	-1.1109	1.1686	0.8146	-0.8089	-0.5824
83	290.5541	4663.322	-24.6595	-0.006	-0.2251	-0.0538	0.5882	-0.5718	0.5954
84	291.5768	4663.303	-24.6784	-0.3231	-0.5193	0.4627	-0.5958	-0.5329	0.1494
85	292.5995	4663.284	-24.6974	-0.0198	-0.2388	0.2026	-0.4565	-0.8232	0.4642
86	293.6222	4663.265	-24.7163	-0.785	-0.869	1.072	-0.1431	-1.153	0.5337
87	294.6449	4663.246	-24.7353	0.1664	-0.0467	0.1915	-0.8222	-1.3921	0.4593
88	295.6676	4663.227	-24.7542	0.6731	0.5533	-0.3361	-0.6655	-1.184	0.1166
89	296.6903	4663.208	-24.7732	-0.3472	-0.5399	0.6447	-0.2128	-1.067	-0.2348
90	297.713	4663.189	-24.7922	0.1802	-0.0318	-0.0761	-0.7874	-0.8485	-0.0574
91	298.7357	4663.17	-24.8111	-1.047	-1.0258	0.9383	-0.5262	-0.7	-0.6075
92	299.7584	4663.151	-24.8301	-0.2542	-0.4591	0.0614	-0.6133	-0.3984	-0.4209
93	300.7811	4663.132	-24.849	-1.0091	-1.005	1.2652	-0.6133	-0.4801	0.5467
94	301.8038	4663.113	-24.868	0.5387	0.3831	-0.4587	-0.0212	-0.9068	0.4557
95	302.8264	4663.094	-24.8869	0.5835	0.439	-0.6036	0.5708	-1.4297	-0.4141
96	303.8491	4663.075	-24.9059	0.78	0.6942	-0.9455	1.5807	-1.3234	-0.0719
97	304.8718	4663.056	-24.9249	-0.1266	-0.3422	0.3289	-0.7003	-1.4694	0.2392
98	305.8945	4663.037	-24.9438	-0.6402	-0.7695	1.0163	-0.6307	-1.0542	0.4132
99	306.9171	4663.018	-24.9628	0.7317	0.6299	-0.4439	-0.77	-0.8572	-0.1896
100	307.9398	4662.999	-24.9817	1.5245	1.8148	-1.3356	-0.7874	-0.9606	-0.2053
101	308.9625	4662.98	-25.0007	0.811	0.736	-0.7188	-0.2302	-0.8443	0.2971
102	309.9851	4662.961	-25.0196	-0.0853	-0.3028	0.2137	-0.7874	-1.2327	-0.0541
103	258.8671	4664.932	-23.0489	-0.0715	-0.2895	0.3624	-0.3172	-0.7096	0.1306
104	259.8899	4664.913	-23.0678	-0.299	-0.4985	0.667	-0.5262	-0.1906	0.1533
105	260.9127	4664.894	-23.0868	-1.695	-1.2843	2.1903	-0.77	0.9007	0.1176
106	261.9355	4664.875	-23.1058	-0.6127	-0.7495	0.8751	-0.4565	0.6736	0.0389
107	262.9583	4664.856	-23.1247	0.1802	-0.0318	0.0243	-0.5958	0.4442	0.0467
108	263.9812	4664.837	-23.1437	0.6386	0.5089	-0.6668	0.7275	0.0734	-0.1405
109	265.004	4664.818	-23.1627	-0.0267	-0.2456	0.0949	0.7623	0.1699	0.3653
110	266.0268	4664.799	-23.1816	0.8179	0.7454	-1.0978	1.5807	-0.0135	-0.7454
111	267.0496	4664.781	-23.2006	0.4559	0.2824	-0.325	-0.1257	-0.3892	-0.3021
112	268.0724	4664.762	-23.2195	0.3525	0.1606	-0.0686	-0.5436	-0.7793	0.1864

113	269.0952	4664.743	-23.2385	-0.068	-0.2861	0.262	-0.0561	-0.6726	0.2778
114	270.1179	4664.724	-23.2575	-1.8881	-1.3257	2.2721	-0.7177	-0.576	0.6245
115	271.1407	4664.705	-23.2764	-1.0401	-1.022	1.1315	0.5708	-0.4316	-0.3039
116	272.1635	4664.686	-23.2954	-1.1711	-1.0895	1.4064	-0.7874	-0.3197	0.2276
117	273.1863	4664.667	-23.3144	-1.7261	-1.2921	1.5439	-0.1954	0.2992	-0.2154
118	274.2091	4664.648	-23.3333	-1.078	-1.0424	1.0757	0.1007	0.2423	0.4171
119	275.2318	4664.629	-23.3523	-0.1025	-0.3193	-0.3807	3.1478	0.7806	0.5749
120	276.2546	4664.61	-23.3713	-1.0401	-1.022	0.9866	0.4489	0.694	0.101
121	277.2774	4664.591	-23.3902	-0.9574	-0.9755	1.1092	0.0484	0.1579	0.4179
122	278.3001	4664.572	-23.4092	-1.1056	-1.0567	1.2429	0.1877	-0.4061	-0.2773
123	279.3229	4664.553	-23.4282	0.8799	0.8305	-0.8451	0.6578	0.0276	0.0292
124	280.3456	4664.534	-23.4471	0.8903	0.8449	-1.1944	0.6927	0.0232	-0.6115
125	281.3684	4664.515	-23.4661	-0.6678	-0.7891	0.6113	1.6678	-0.1099	0.6472
126	282.3911	4664.496	-23.485	-2.0949	-1.352	2.1866	0.832	-0.3158	-0.0379
127	283.4139	4664.477	-23.504	-1.6157	-1.2626	1.8002	-0.5088	-0.2056	0.0104
128	284.4366	4664.458	-23.523	-0.5954	-0.7368	0.5741	0.7971	-0.0536	0.3749
129	285.4594	4664.439	-23.5419	0.2009	-0.0094	0.1283	-0.7874	-0.1896	0.0517
130	286.4821	4664.42	-23.5609	-1.1021	-1.055	1.3284	-0.6481	-0.2865	-0.1091
131	287.5048	4664.401	-23.5799	-0.4162	-0.5973	0.8082	-0.5958	0.0026	0.117
132	288.5276	4664.382	-23.5988	-1.7915	-1.3071	2.0789	-0.4043	-0.3617	-0.3353
133	289.5503	4664.363	-23.6178	-1.4365	-1.2033	1.4807	1.0931	-0.4882	0.513
134	290.573	4664.344	-23.6367	-1.1918	-1.0995	1.1166	0.0658	-0.4054	0.1078
135	291.5957	4664.325	-23.6557	-0.3576	-0.5486	0.641	-0.6133	-0.3169	-0.6952
136	292.6184	4664.306	-23.6747	0.7179	0.6118	-0.4476	-0.3521	-0.3435	-0.0978
137	293.6412	4664.287	-23.6936	0.0837	-0.1339	-0.0723	0.8842	-0.531	0.2614
138	294.6639	4664.269	-23.7126	0.356	0.1646	-0.1578	-0.0561	-0.4746	0.2232
139	295.6866	4664.25	-23.7315	-0.6127	-0.7495	0.6559	-0.8048	-0.4648	-0.5512
140	296.7093	4664.231	-23.7505	-1.34	-1.1655	1.1315	-0.4391	-0.3795	-0.5776
141	297.732	4664.212	-23.7695	-1.2952	-1.1465	1.3655	-0.7003	-0.064	-0.0398
142	298.7547	4664.193	-23.7884	-1.5468	-1.2414	1.5587	0.4663	-0.1292	-0.1525
143	299.7774	4664.174	-23.8074	0.0802	-0.1375	0.0837	-0.2302	0.1765	0.3368

144	300.8	4664.155	-23.8263	-1.1159	-1.062	1.3952	-0.6307	-0.1417	-0.0126
145	301.8227	4664.136	-23.8453	0.3663	0.1766	-0.0018	-0.7003	-0.2925	-0.5554
146	302.8454	4664.117	-23.8643	-0.4851	-0.6526	0.745	-0.6829	-0.8772	-0.5473
147	303.8681	4664.098	-23.8832	-0.461	-0.6335	0.7934	-0.7526	-0.8554	0.6528
148	304.8908	4664.079	-23.9022	-0.4644	-0.6362	0.6596	-0.4914	-0.4734	0.2113
149	305.9134	4664.06	-23.9211	-0.0646	-0.2828	-0.1169	0.9016	-0.2279	0.0009
150	306.9361	4664.041	-23.9401	0.4042	0.2209	-0.3361	-0.6307	-0.2777	-0.4824
151	307.9588	4664.022	-23.9591	1.1385	1.2034	-1.0904	-0.5784	-0.2063	0.375
152	308.9814	4664.003	-23.978	0.9868	0.9811	-0.6742	-0.8048	-0.3471	0.5515
153	310.0041	4663.984	-23.997	0.4835	0.3156	-0.3064	-0.7177	-0.7798	0.4235
154	258.886	4665.955	-22.026	-1.0987	-1.0532	1.5179	-0.6829	-0.8183	0.6674
155	259.9089	4665.936	-22.045	-1.6364	-1.2685	1.9971	-0.8919	-0.3455	0.3158
156	260.9317	4665.917	-22.064	-0.5851	-0.7291	0.942	-0.4914	0.4402	0.6397
157	261.9545	4665.898	-22.0829	-1.3159	-1.1554	1.6107	-0.5088	0.1401	0.4894
158	262.9773	4665.879	-22.1019	-1.4055	-1.1916	1.8077	-0.6829	0.0175	0.3359
159	264.0001	4665.86	-22.1209	-1.6123	-1.2616	1.9377	-0.5436	0.0028	0.5536
160	265.0229	4665.841	-22.1398	-0.7299	-0.8322	0.7525	0.5534	0.3333	0.0097
161	266.0457	4665.822	-22.1588	1.3212	1.4846	-1.4359	1.0061	0.3635	0.0815
162	267.0685	4665.803	-22.1778	0.1767	-0.0355	-0.1244	-0.1083	-0.3722	-0.3227
163	268.0913	4665.784	-22.1968	1.0006	1.0009	-1.1461	1.3892	-0.7244	-0.4701
164	269.1141	4665.765	-22.2157	-0.0439	-0.2626	-0.2321	2.3468	-0.6135	0.0132
165	270.1369	4665.746	-22.2347	-1.9156	-1.3303	1.9786	0.9364	-0.5958	-0.2672
166	271.1597	4665.727	-22.2537	-0.7609	-0.8531	0.7116	1.6678	-0.2746	0.5661
167	272.1825	4665.708	-22.2726	-0.9539	-0.9735	1.1835	-0.8396	-0.1422	0.152
168	273.2053	4665.69	-22.2916	-1.0815	-1.0442	0.9383	0.6753	0.1883	-0.5749
169	274.228	4665.671	-22.3106	-1.4537	-1.2096	1.4658	0.6927	0.1648	0.4231
170	275.2508	4665.652	-22.3295	0.3387	0.1448	-0.377	-0.0735	0.3744	0.5233
171	276.2736	4665.633	-22.3485	-1.2366	-1.1205	1.3247	-0.5436	0.04	0.0219
172	277.2963	4665.614	-22.3675	0.4663	0.2948	-0.6482	1.3717	-0.3721	-0.3808
173	278.3191	4665.595	-22.3864	0.3698	0.1806	-0.4216	1.1628	-0.6444	0.604
174	279.3419	4665.576	-22.4054	-0.8781	-0.9282	1.1277	-0.77	-0.4909	0.0664

175	280.3646	4665.557	-22.4244	-0.947	-0.9695	0.7673	0.2399	-0.51	-0.1564
176	281.3874	4665.538	-22.4433	0.0526	-0.1659	0.1617	-0.561	-0.3425	0.1502
177	282.4101	4665.519	-22.4623	-0.8953	-0.9387	0.8491	0.7797	-0.5511	-0.5188
178	283.4329	4665.5	-22.4813	-0.7781	-0.8645	1.1946	-0.6307	-0.3686	0.7162
179	284.4556	4665.481	-22.5002	-0.5989	-0.7393	0.6596	0.5882	-0.469	-0.03
180	285.4783	4665.462	-22.5192	-0.0232	-0.2422	-0.2395	0.2748	-0.2254	-0.5676
181	286.5011	4665.443	-22.5382	-0.5265	-0.6848	0.8342	-0.3172	0.0731	0.6048
182	287.5238	4665.424	-22.5571	-1.4572	-1.2108	1.6962	-0.7003	0.3118	0.7955
183	288.5465	4665.405	-22.5761	-1.2986	-1.148	1.1612	0.3444	-0.0003	0.2372
184	289.5693	4665.386	-22.5951	-0.068	-0.2861	-0.0501	1.6503	-0.0276	0.2042
185	290.592	4665.367	-22.614	-0.7264	-0.8298	0.5556	0.8668	-0.2965	-0.2571
186	291.6147	4665.348	-22.633	-0.6264	-0.7595	0.9197	-0.7351	-0.092	0.7939
187	292.6374	4665.329	-22.652	-1.2676	-1.1345	1.6665	-0.8919	0.1518	0.0577
188	293.6601	4665.31	-22.6709	-1.5261	-1.2347	1.4918	-0.561	0.15	-0.435
189	294.6828	4665.291	-22.6899	-1.1056	-1.0567	1.0646	-0.8919	-0.0305	-0.7248
190	295.7055	4665.272	-22.7088	0.4353	0.2577	-0.4179	-0.1779	0.0888	0.3884
191	296.7282	4665.253	-22.7278	-0.592	-0.7342	0.8082	-0.3521	0.1258	0.0744
192	297.7509	4665.234	-22.7468	0.0595	-0.1588	0.1134	-0.8048	0.191	-0.2223
193	298.7736	4665.215	-22.7657	-0.7574	-0.8508	1.0163	-0.857	-0.1705	-0.0713
194	299.7963	4665.196	-22.7847	0.3043	0.1054	-0.0686	-0.3869	0.0429	0.6487
195	300.819	4665.177	-22.8037	-0.4541	-0.628	0.6745	-0.8919	-0.3039	0.0242
196	301.8417	4665.158	-22.8226	-0.5678	-0.7163	0.7971	-0.77	-0.4759	0.221
197	302.8644	4665.14	-22.8416	-0.7126	-0.8204	0.9717	-0.6829	-0.5915	0.5445
198	303.887	4665.121	-22.8606	-0.6023	-0.7419	0.7859	-0.4914	-0.4039	0.4209
199	304.9097	4665.102	-22.8795	0.156	-0.0577	0.0354	-0.561	-0.3057	-0.2177
200	305.9324	4665.083	-22.8985	-0.2886	-0.4895	0.5073	-0.8919	-0.0086	-0.5928
201	306.9551	4665.064	-22.9174	0.4663	0.2948	-0.2655	-0.5958	-0.0831	0.4662
202	307.9777	4665.045	-22.9364	1.3453	1.5228	-1.135	-0.857	0.0425	0.4184
203	309.0004	4665.026	-22.9554	1.297	1.4466	-1.1424	-0.8919	-0.3009	-0.1214
204	310.023	4665.007	-22.9743	-0.2369	-0.4437	0.3289	-0.7526	-0.907	-0.6175
205	258.905	4666.978	-21.0032	1.2419	1.3608	-1.3876	0.832	-0.9244	0.1059

206	259.9278	4666.959	-21.0222	1.3763	1.5723	-1.2984	-0.5088	-0.5171	-0.496
207	260.9507	4666.94	-21.0412	-0.7436	-0.8415	0.719	0.9364	-0.0918	-0.5889
208	261.9735	4666.921	-21.0601	-0.0129	-0.2319	0.2398	-0.2302	-0.1157	-0.7188
209	262.9963	4666.902	-21.0791	0.8248	0.7547	-0.5925	-0.6829	-0.317	0.1107
210	264.0191	4666.883	-21.0981	-0.5265	-0.6848	0.9605	-0.7526	-0.1736	0.1404
211	265.0419	4666.864	-21.117	0.1664	-0.0467	0.184	-0.7526	0.038	0.303
212	266.0647	4666.845	-21.136	0.1285	-0.087	0.1246	-0.5958	-0.017	0.3579
213	267.0875	4666.826	-21.155	-1.1745	-1.0912	1.529	-0.77	-0.33	-0.4236
214	268.1103	4666.807	-21.174	-1.5813	-1.2523	1.7668	0.2748	-0.7452	0.6334
215	269.1331	4666.788	-21.1929	-0.4231	-0.6029	0.0614	2.521	-0.624	-0.0657
216	270.1559	4666.769	-21.2119	-1.5571	-1.2447	1.8374	-0.6655	-0.8112	0.4096
217	271.1787	4666.75	-21.2309	0.3008	0.1015	-0.7151	2.4339	-0.5846	-0.3565
218	272.2014	4666.731	-21.2498	-1.2297	-1.1173	1.5513	-0.857	-0.3154	0.524
219	273.2242	4666.712	-21.2688	-0.3989	-0.5831	0.3809	0.8494	0.0922	-0.3774
220	274.247	4666.693	-21.2878	-1.34	-1.1655	1.3878	0.5534	0.0434	0.0623
221	275.2698	4666.674	-21.3068	0.3353	0.1408	-0.429	0.8494	0.1212	-0.032
222	276.2925	4666.655	-21.3257	-0.2542	-0.4591	0.459	-0.3521	-0.0812	0.3511
223	277.3153	4666.636	-21.3447	1.5831	1.9133	-1.3133	-0.7526	-0.301	-0.0869
224	278.3381	4666.617	-21.3637	1.0213	1.0307	-1.0458	0.623	-0.8839	-0.6284
225	279.3608	4666.598	-21.3826	0.0251	-0.1939	0.2658	-0.3695	-0.5693	0.4856
226	280.3836	4666.579	-21.4016	0.0078	-0.2113	0.0466	-0.3695	-0.2354	0.0237
227	281.4063	4666.561	-21.4206	0.2457	0.0398	-0.2916	1.0235	-0.1198	0.3718
228	282.4291	4666.542	-21.4396	0.8386	0.7736	-1.0681	1.0931	-0.3322	-0.1223
229	283.4518	4666.523	-21.4585	0.5766	0.4303	-0.6854	0.2922	-0.2079	0.0556
230	284.4746	4666.504	-21.4775	0.1492	-0.0651	-0.5256	-0.0909	-0.4045	-0.6198
231	285.4973	4666.485	-21.4965	0.0216	-0.1974	0.2769	-0.6481	-0.3406	0.0101
232	286.52	4666.466	-21.5154	-0.4886	-0.6553	0.3401	-0.3695	-0.17	-0.6174
233	287.5428	4666.447	-21.5344	-1.4848	-1.2206	1.2726	0.0832	0.1366	0.3813
234	288.5655	4666.428	-21.5534	-1.6261	-1.2656	0.916	2.7125	0.0812	-0.526
235	289.5882	4666.409	-21.5723	-0.8746	-0.926	0.2509	1.9289	-0.2244	-0.3967
236	290.6109	4666.39	-21.5913	-0.8022	-0.8803	0.511	0.1007	-0.2302	-0.3747

237	291.6337	4666.371	-21.6103	-0.7574	-0.8508	0.6373	-0.6829	0.3095	-0.2545
238	292.6564	4666.352	-21.6292	-1.6985	-1.2852	0.9977	0.8668	0.3721	-0.3467
239	293.6791	4666.333	-21.6482	-1.1642	-1.0862	0.8714	0.3967	0.4571	-0.4492
240	294.7018	4666.314	-21.6672	-0.4058	-0.5888	0.7413	-0.7003	0.2114	0.3105
241	295.7245	4666.295	-21.6861	-1.3986	-1.1889	1.685	-0.4914	-0.1065	0.4489
242	296.7472	4666.276	-21.7051	-0.8436	-0.9067	1.046	-0.2476	-0.2341	-0.3596
243	297.7699	4666.257	-21.7241	-0.2025	-0.4126	0.4107	-0.5958	-0.234	-0.3065
244	298.7926	4666.238	-21.743	-1.5123	-1.2301	1.7668	-0.8919	-0.443	0.2373
245	299.8153	4666.219	-21.762	0.0078	-0.2113	-0.0278	-0.8048	-0.2686	0.2119
246	300.838	4666.2	-21.781	-0.3128	-0.5104	0.511	-0.6307	-0.2175	0.3934
247	301.8607	4666.181	-21.7999	0.1836	-0.0281	-0.2321	0.6056	-0.3835	-0.1943
248	302.8833	4666.162	-21.8189	-0.4265	-0.6057	0.6745	-0.77	-0.5474	-0.5662
249	303.906	4666.143	-21.8379	-1.178	-1.0929	1.4956	-0.7526	-0.3978	-0.569
250	304.9287	4666.124	-21.8568	0.418	0.2372	-0.4587	-0.3869	-0.5219	-0.2628
251	305.9514	4666.105	-21.8758	0.8282	0.7594	-0.6408	-0.3521	-0.244	0.2247
252	306.974	4666.086	-21.8948	0.5249	0.3661	-0.3919	-0.7526	-0.1015	0.2366
253	307.9967	4666.067	-21.9137	1.0385	1.0557	-0.9306	-0.8919	0.29	-0.258
254	309.0193	4666.048	-21.9327	0.4422	0.2659	-0.6222	-0.5262	-0.0642	-0.6414
255	310.042	4666.029	-21.9517	1.5487	1.8552	-1.2724	-0.6829	-0.9304	0.5484
256	258.924	4668.001	-19.9804	-0.8815	-0.9303	-1.0829	3.8791	-1.2955	-0.6086
257	259.9468	4667.982	-19.9994	1.5418	1.8436	-1.3987	-0.1779	-0.7706	0.1901
258	260.9696	4667.963	-20.0183	0.2457	0.0398	0.0428	-0.474	-0.3481	0.5607
259	261.9925	4667.944	-20.0373	-1.3331	-1.1626	1.7222	-0.7526	-0.4131	0.6402
260	263.0153	4667.925	-20.0563	-0.4334	-0.6113	0.4515	0.7971	-0.5845	-0.4151
261	264.0381	4667.906	-20.0753	-0.5403	-0.6954	0.7079	0.5011	-0.5255	0.3719
262	265.0609	4667.887	-20.0942	-0.2335	-0.4406	0.3215	0.327	-0.1416	0.0794
263	266.0837	4667.868	-20.1132	-1.2504	-1.1267	1.4807	-0.1257	0.0727	0.6505
264	267.1065	4667.849	-20.1322	-0.592	-0.7342	0.9754	-0.4217	0.0862	0.3973
265	268.1293	4667.83	-20.1512	-1.7261	-1.2921	2.1792	-0.8919	-0.3204	0.079
266	269.1521	4667.811	-20.1701	-0.9298	-0.9594	1.3618	-0.5958	-0.176	0.7092
267	270.1749	4667.792	-20.1891	-2.25	-1.3594	2.7477	-0.8919	-0.6628	0.2857

268	271.1976	4667.773	-20.2081	0.7972	0.7174	-0.8006	0.832	-0.6318	-0.4735
269	272.2204	4667.754	-20.2271	0.2043	-0.0057	0.0131	-0.561	-0.4126	0.2279
270	273.2432	4667.735	-20.246	0.6731	0.5533	-0.5665	-0.0561	0.1523	0.2091
271	274.266	4667.716	-20.265	-0.0542	-0.2727	0.0131	0.1703	-0.0496	-0.5456
272	275.2887	4667.697	-20.284	-1.6433	-1.2704	1.8671	-0.5262	0.1428	0.4662
273	276.3115	4667.678	-20.303	-1.9984	-1.3421	2.09	0.2574	0.0968	0.3294
274	277.3343	4667.659	-20.3219	0.0802	-0.1375	0.0466	-0.0212	0.0083	0.513
275	278.357	4667.64	-20.3409	0.7041	0.5937	-0.6371	0.1877	-0.3331	-0.0142
276	279.3798	4667.621	-20.3599	0.2595	0.0551	-0.0092	-0.4043	-0.0062	-0.4572
277	280.4025	4667.602	-20.3789	-0.3817	-0.5689	0.2546	0.9364	0.2632	-0.3788
278	281.4253	4667.583	-20.3978	0.7627	0.6711	-1.0904	1.1802	0.5272	0.2453
279	282.448	4667.564	-20.4168	0.4387	0.2618	-1.0049	0.623	0.0438	-0.5808
280	283.4708	4667.545	-20.4358	-0.3989	-0.5831	0.0986	1.0061	-0.2506	-0.209
281	284.4935	4667.526	-20.4548	0.9075	0.8689	-0.7931	-0.1431	-0.3719	-0.1882
282	285.5163	4667.507	-20.4737	-0.0956	-0.3127	0.2546	0.2399	-0.367	0.4849
283	286.539	4667.488	-20.4927	-0.6195	-0.7545	0.8119	0.0136	-0.263	0.1828
284	287.5617	4667.469	-20.5117	-1.3365	-1.1641	1.5773	-0.4391	-0.1307	0.1409
285	288.5845	4667.45	-20.5306	-0.4334	-0.6113	0.3066	1.5633	0.073	0.0316
286	289.6072	4667.431	-20.5496	-1.047	-1.0258	0.7896	2.2075	-0.3142	0.4708
287	290.6299	4667.413	-20.5686	-1.1366	-1.0725	1.5364	-0.8919	-0.3818	-0.1173
288	291.6526	4667.394	-20.5876	-1.6881	-1.2825	1.8151	-0.6655	-0.1537	-0.2261
289	292.6753	4667.375	-20.6065	-1.8605	-1.3208	2.1903	-0.7526	0.3062	-0.6464
290	293.6981	4667.356	-20.6255	-2.0501	-1.3479	2.469	-0.8048	0.3638	0.1496
291	294.7208	4667.337	-20.6445	-0.2266	-0.4344	0.4664	-0.8048	-0.0013	0.6069
292	295.7435	4667.318	-20.6634	-0.8264	-0.8958	1.1054	-0.6481	-0.1076	-0.6486
293	296.7662	4667.299	-20.6824	-0.3403	-0.534	0.4181	-0.1083	-0.0341	0.2167
294	297.7889	4667.28	-20.7014	0.5938	0.452	-0.4476	-0.7526	-0.2046	-0.1846
295	298.8116	4667.261	-20.7204	-0.3472	-0.5399	0.5964	-0.5262	-0.4953	0.4451
296	299.8342	4667.242	-20.7393	-0.2955	-0.4955	0.4664	0.3444	-0.3067	0.1997
297	300.8569	4667.223	-20.7583	-0.7988	-0.878	0.9717	-0.561	-0.4605	-0.6923
298	301.8796	4667.204	-20.7773	0.2215	0.0132	-0.3176	0.7623	-0.4606	-0.3284

299	302.9023	4667.185	-20.7962	0.0664	-0.1517	0.1023	-0.4914	-0.8914	-0.0711
300	303.925	4667.166	-20.8152	-0.0025	-0.2216	0.2732	-0.4565	-0.7685	0.2879
301	304.9477	4667.147	-20.8342	0.6731	0.5533	-0.6074	-0.1605	-0.7523	-0.3127
302	305.9703	4667.128	-20.8531	0.3698	0.1806	-0.3176	0.1355	-0.7147	0.7736
303	306.993	4667.109	-20.8721	0.2457	0.0398	-0.1318	-0.2824	0.1693	0.2546
304	308.0157	4667.09	-20.8911	-0.0094	-0.2285	-0.3176	-0.8396	0.5773	-0.6403
305	309.0383	4667.071	-20.91	1.5142	1.7976	-1.3504	-0.8744	0.2212	0.255
306	310.061	4667.052	-20.929	1.5556	1.8668	-1.3542	-0.8919	-0.8198	0.0317
307	258.943	4669.024	-18.9576	0.0561	-0.1623	-0.6631	0.1355	-1.2734	-0.373
308	259.9658	4669.005	-18.9765	0.5111	0.3492	-1.0569	-0.8396	-0.8888	-0.5732
309	260.9886	4668.986	-18.9955	-0.0818	-0.2994	0.1654	0.2051	-0.5615	-0.4821
310	262.0114	4668.967	-19.0145	0.5973	0.4563	-0.3213	-0.3347	-0.6024	0.0899
311	263.0342	4668.948	-19.0335	-0.0404	-0.2592	0.4144	-0.8744	-0.5999	0.6633
312	264.057	4668.929	-19.0525	0.3077	0.1094	-0.0426	-0.2998	-0.5098	-0.0954
313	265.0799	4668.91	-19.0714	-0.4265	-0.6057	0.6559	-0.2998	-0.0204	0.2786
314	266.1027	4668.891	-19.0904	-0.8884	-0.9345	0.6893	1.424	0.346	0.2647
315	267.1255	4668.872	-19.1094	0.4284	0.2495	-0.403	0.7275	0.5545	0.0075
316	268.1482	4668.853	-19.1284	-0.2404	-0.4468	0.5147	-0.8919	0.4169	-0.4058
317	269.171	4668.834	-19.1474	-1.4985	-1.2254	1.8745	-0.2128	0.0474	0.2477
318	270.1938	4668.815	-19.1663	-1.9019	-1.3281	2.1049	0.2574	-0.2351	0.4576
319	271.2166	4668.796	-19.1853	0.6283	0.4957	-0.6297	0.8668	-0.0558	-0.3312
320	272.2394	4668.777	-19.2043	0.2422	0.036	-0.1132	-0.7177	0.0446	-0.0274
321	273.2622	4668.758	-19.2233	1.073	1.1062	-0.99	0.1529	0.5501	0.5852
322	274.2849	4668.739	-19.2422	1.1867	1.2763	-1.0755	-0.5436	0.4772	-0.1282
323	275.3077	4668.72	-19.2612	-0.8746	-0.926	1.0794	-0.6481	0.714	-0.3502
324	276.3305	4668.701	-19.2802	-1.7743	-1.3033	2.0492	-0.4217	0.4744	0.3875
325	277.3533	4668.682	-19.2992	-0.2507	-0.456	0.3438	0.4489	0.4624	-0.1479
326	278.376	4668.663	-19.3182	-0.0198	-0.2388	-0.1615	0.9016	0.1862	0.2064
327	279.3988	4668.644	-19.3371	-0.0404	-0.2592	-0.2172	0.0136	0.3834	-0.0185
328	280.4215	4668.625	-19.3561	0.1871	-0.0244	-0.7188	0.6056	0.494	-0.1883
329	281.4443	4668.606	-19.3751	-0.5644	-0.7137	-0.1801	0.1529	0.5492	-0.346

330	282.467	4668.587	-19.3941	0.1216	-0.0943	-0.4067	0.2574	0.085	-0.2602
331	283.4898	4668.568	-19.413	0.0906	-0.1268	-0.4253	2.2946	-0.6694	0.232
332	284.5125	4668.549	-19.432	-0.8402	-0.9045	1.0609	-0.1083	-0.8446	0.6404
333	285.5352	4668.53	-19.451	-0.3955	-0.5803	0.3289	0.7449	-0.7877	-0.1561
334	286.558	4668.511	-19.47	0.063	-0.1553	-0.195	0.3096	-0.3442	0.2948
335	287.5807	4668.492	-19.4889	-0.9643	-0.9795	1.1537	-0.7526	-0.0661	0.2917
336	288.6034	4668.473	-19.5079	-0.8746	-0.926	0.916	0.832	-0.0682	-0.2739
337	289.6262	4668.454	-19.5269	-1.8846	-1.3251	2.2907	-0.8919	-0.3687	-0.1822
338	290.6489	4668.435	-19.5459	0.0699	-0.1482	-0.024	0.2574	-0.5721	-0.4208
339	291.6716	4668.416	-19.5648	-1.1021	-1.055	1.072	0.3618	-0.4518	0.2381
340	292.6943	4668.397	-19.5838	-1.5951	-1.2564	2.012	-0.7177	0.0183	0.0087
341	293.717	4668.378	-19.6028	-1.4951	-1.2242	1.6962	-0.5262	-0.0083	0.5795
342	294.7397	4668.359	-19.6218	-0.7953	-0.8758	1.0646	-0.5088	-0.0443	-0.5308
343	295.7624	4668.34	-19.6407	-1.2159	-1.1109	1.5141	-0.8919	-0.0928	0.3499
344	296.7851	4668.321	-19.6597	-1.3882	-1.1849	1.5996	-0.5958	-0.1676	0.127
345	297.8078	4668.302	-19.6787	-0.2748	-0.4774	0.5444	-0.8222	-0.1796	0.4614
346	298.8305	4668.283	-19.6977	-0.168	-0.3809	0.2769	-0.2824	-0.402	0.2911
347	299.8532	4668.264	-19.7166	-1.1642	-1.0862	1.503	-0.5784	-0.2928	-0.7271
348	300.8759	4668.246	-19.7356	-0.4782	-0.6472	0.5741	0.0136	-0.1867	-0.0297
349	301.8986	4668.227	-19.7546	-1.271	-1.136	1.6442	-0.561	-0.4498	0.0248
350	302.9213	4668.208	-19.7736	-0.3714	-0.5602	0.8194	-0.8919	-0.8651	-0.1138
351	303.9439	4668.189	-19.7925	0.1423	-0.0724	0.0205	-0.77	-0.9131	0.2535
352	304.9666	4668.17	-19.8115	-0.1714	-0.3841	0.3586	-0.4043	-0.7158	0.6637
353	305.9893	4668.151	-19.8305	0.6042	0.465	-0.4996	0.4489	-0.6916	0.1831
354	307.012	4668.132	-19.8494	1.2005	1.2973	-1.0532	-0.4391	-0.02	-0.2179
355	308.0346	4668.113	-19.8684	-0.1783	-0.3905	0.0391	-0.3695	0.4244	-0.5341
356	309.0573	4668.094	-19.8874	1.1798	1.2658	-1.0941	-0.77	0.3733	0.2592
357	310.0799	4668.075	-19.9064	0.7489	0.6528	-0.6742	-0.1779	-0.7888	0.1837
358	258.962	4670.046	-17.9347	0.9316	0.9027	-1.1498	1.8419	-1.1039	0.2131
359	259.9848	4670.027	-17.9537	1.1936	1.2867	-0.9492	-0.6655	-0.7837	-0.0955
360	261.0076	4670.008	-17.9727	-0.6437	-0.7719	0.0503	1.5459	-0.4443	-0.1274

361	262.0304	4669.989	-17.9917	-0.7816	-0.8668	0.4292	0.0484	-0.6226	-0.669
362	263.0532	4669.97	-18.0107	0.4215	0.2413	-0.2544	-0.5436	-0.3377	-0.6149
363	264.076	4669.951	-18.0297	0.0113	-0.2078	-0.1281	1.4588	-0.3943	-0.5396
364	265.0988	4669.932	-18.0486	0.0216	-0.1974	-0.1615	1.7722	0.0682	-0.3185
365	266.1216	4669.913	-18.0676	0.1767	-0.0355	0.0094	-0.3521	0.5073	-0.6218
366	267.1444	4669.895	-18.0866	-0.4231	-0.6029	0.1803	-0.6655	0.6185	-0.5932
367	268.1672	4669.876	-18.1056	0.5214	0.3619	-0.6111	-0.4391	1.7284	0.0958
368	269.19	4669.857	-18.1246	-0.916	-0.9512	0.8156	1.5285	2.1284	0.558
369	270.2128	4669.838	-18.1435	-0.8712	-0.9239	0.3921	2.9214	1.2543	-0.1156
370	271.2356	4669.819	-18.1625	0.4042	0.2209	-0.7783	0.1703	0.3675	-0.3155
371	272.2584	4669.8	-18.1815	0.2974	0.0976	-0.9603	1.0583	0.3377	-0.479
372	273.2812	4669.781	-18.2005	0.9523	0.932	-1.3876	0.9016	0.5202	-0.4236
373	274.3039	4669.762	-18.2195	-0.5368	-0.6927	0.0317	-0.0038	0.4404	-0.4018
374	275.3267	4669.743	-18.2385	0.2078	-0.0019	-0.2544	-0.5436	0.7404	0.2421
375	276.3495	4669.724	-18.2574	0.156	-0.0577	-0.0501	-0.1257	0.5754	0.648
376	277.3722	4669.705	-18.2764	-0.5885	-0.7317	0.537	0.1703	0.3408	-0.0059
377	278.395	4669.686	-18.2954	0.1078	-0.1088	-0.4773	1.0757	-0.0043	-0.3376
378	279.4177	4669.667	-18.3144	1.4487	1.6896	-1.3059	-0.1083	0.0907	0.1323
379	280.4405	4669.648	-18.3334	1.7348	2.1753	-1.4359	-0.8919	0.5201	0.6406
380	281.4633	4669.629	-18.3523	0.1905	-0.0206	-0.1169	-0.7874	0.2702	-0.3776
381	282.486	4669.61	-18.3713	0.7662	0.6757	-0.9009	1.3369	-0.2186	0.0989
382	283.5087	4669.591	-18.3903	0.6628	0.5399	-0.6742	0.9016	-1.0165	0.7401
383	284.5315	4669.572	-18.4093	1.1695	1.2501	-1.0384	0.0136	-1.0347	-0.2777
384	285.5542	4669.553	-18.4283	0.1457	-0.0688	-0.1801	1.1802	-0.3428	0.2081
385	286.577	4669.534	-18.4472	-0.6506	-0.7769	0.7042	0.2922	-0.0697	-0.1349
386	287.5997	4669.515	-18.4662	0.0733	-0.1446	-0.0946	0.6927	0.3903	0.3868
387	288.6224	4669.496	-18.4852	-1.1642	-1.0862	1.3841	-0.3869	0.3507	0.5823
388	289.6451	4669.477	-18.5042	-1.3951	-1.1876	1.6739	-0.6829	-0.1038	0.0388
389	290.6679	4669.458	-18.5231	-0.199	-0.4094	0.5444	-0.4914	-0.3922	-0.0837
390	291.6906	4669.439	-18.5421	-1.2848	-1.1421	1.5624	-0.8919	-0.3808	-0.2079
391	292.7133	4669.42	-18.5611	-1.0022	-1.0011	1.176	0.0658	-0.163	0.203

392	293.736	4669.401	-18.5801	-1.8467	-1.3182	2.1309	-0.2302	-0.2654	-0.5116
393	294.7587	4669.382	-18.5991	-1.6433	-1.2704	1.96	-0.8919	-0.4582	-0.5044
394	295.7814	4669.363	-18.618	-1.6261	-1.2656	1.8077	-0.5088	-0.4913	-0.1193
395	296.8041	4669.344	-18.637	-0.7747	-0.8622	1.0349	-0.4391	-0.3388	0.6673
396	297.8268	4669.325	-18.656	-0.2886	-0.4895	0.4627	-0.8222	-0.355	0.0017
397	298.8495	4669.306	-18.675	0.0285	-0.1904	0.1023	-0.3521	-0.4136	-0.5502
398	299.8722	4669.287	-18.6939	-1.2159	-1.1109	1.4064	-0.4391	-0.215	-0.2392
399	300.8949	4669.268	-18.7129	-0.8574	-0.9153	0.994	-0.5262	-0.0066	0.6602
400	301.9176	4669.249	-18.7319	-1.2573	-1.1298	1.5959	-0.7177	-0.4289	0.321
401	302.9402	4669.23	-18.7509	-2.0397	-1.3468	2.3315	-0.0735	-0.7899	0.6649
402	303.9629	4669.211	-18.7699	-0.6885	-0.8037	0.6336	-0.3695	-0.7579	0.349
403	304.9856	4669.192	-18.7888	0.1043	-0.1124	-0.0501	0.2922	-0.4954	0.3791
404	306.0083	4669.173	-18.8078	1.1867	1.2763	-1.1907	-0.2476	-0.6186	-0.5076
405	307.0309	4669.154	-18.8268	1.1867	1.2763	-1.2167	0.4837	-0.1709	0.3172
406	308.0536	4669.135	-18.8458	0.8937	0.8497	-0.6742	-0.5958	0.0184	0.0062
407	309.0763	4669.116	-18.8647	0.2732	0.0705	-0.3064	-0.6307	-0.1644	0.0022
408	310.0989	4669.097	-18.8837	-0.623	-0.757	0.8714	-0.4914	-0.9514	0.2802
409	258.9809	4671.069	-16.9119	1.4728	1.7291	-1.343	0.0136	-1.205	0.2418
410	260.0038	4671.05	-16.9309	0.0216	-0.1974	0.1654	0.2051	-0.9312	-0.0622
411	261.0266	4671.031	-16.9499	-0.4541	-0.628	0.9048	-0.8048	-0.3778	0.6011
412	262.0494	4671.012	-16.9689	0.4215	0.2413	-0.3176	0.2922	-0.6225	-0.1264
413	263.0722	4670.993	-16.9879	-0.4679	-0.639	-0.0835	2.4339	-0.3678	0.1682
414	264.095	4670.974	-17.0068	-0.6437	-0.7719	0.0168	1.4414	-0.3488	-0.2629
415	265.1178	4670.955	-17.0258	-0.5127	-0.6742	0.2843	0.1007	0.0318	0.1342
416	266.1406	4670.936	-17.0448	0.5559	0.4045	-0.5739	-0.5958	0.1514	0.1182
417	267.1634	4670.917	-17.0638	0.0699	-0.1482	-0.1392	1.1454	0.909	-0.0505
418	268.1862	4670.898	-17.0828	-0.6299	-0.762	0.236	1.2499	1.9706	-0.5186
419	269.209	4670.879	-17.1018	-1.1883	-1.0979	-0.8229	-0.3869	2.3451	-0.572
420	270.2318	4670.86	-17.1208	-0.0404	-0.2592	-0.3993	0.1877	2.268	-0.1427
421	271.2546	4670.841	-17.1397	-0.492	-0.658	0.3326	0.9887	0.6057	-0.1384
422	272.2774	4670.822	-17.1587	0.1009	-0.116	-0.0426	0.4315	0.1246	0.0767

423	273.3001	4670.803	-17.1777	-1.6226	-1.2646	1.7854	0.2748	0.1432	0.5038
424	274.3229	4670.784	-17.1967	-2.0087	-1.3433	2.2461	-0.3869	0.1897	0.4936
425	275.3457	4670.765	-17.2157	-1.1021	-1.055	0.9457	0.2051	0.4946	-0.1821
426	276.3684	4670.746	-17.2347	0.3318	0.1369	-0.6036	0.0658	0.1738	0.1751
427	277.3912	4670.727	-17.2537	-0.4506	-0.6252	0.1692	1.4588	-0.2738	0.4584
428	278.414	4670.708	-17.2726	0.4697	0.299	-0.3919	0.0136	-0.3231	0.5931
429	279.4367	4670.689	-17.2916	1.5245	1.8148	-1.4359	0.0658	-0.3221	0.4737
430	280.4595	4670.671	-17.3106	0.5525	0.4002	-0.6036	0.4315	-0.3388	-0.6202
431	281.4822	4670.652	-17.3296	-0.0025	-0.2216	0.1654	-0.3172	-0.4012	-0.2379
432	282.505	4670.633	-17.3486	-0.2645	-0.4683	0.2212	-0.4391	-0.8001	-0.5217
433	283.5277	4670.614	-17.3676	1.2522	1.3768	-1.4359	1.2499	-1.1941	-0.3873
434	284.5505	4670.595	-17.3865	1.3729	1.5668	-1.4359	0.6056	-1.2263	-0.1975
435	285.5732	4670.576	-17.4055	0.2698	0.0666	-0.4513	1.4588	-0.3379	0.0255
436	286.5959	4670.557	-17.4245	-0.916	-0.9512	1.1463	-0.5088	0.2327	0.2061
437	287.6187	4670.538	-17.4435	0.4525	0.2782	-0.678	1.2847	0.3748	-0.5433
438	288.6414	4670.519	-17.4625	0.5594	0.4088	-0.6742	1.215	0.3112	-0.2479
439	289.6641	4670.5	-17.4814	-0.7299	-0.8322	0.8565	0.031	-0.115	0.67
440	290.6868	4670.481	-17.5004	-1.8398	-1.3169	2.2535	-0.7874	-0.1885	0.5175
441	291.7096	4670.462	-17.5194	-1.7571	-1.2994	1.8485	-0.4391	-0.1891	-0.3344
442	292.7323	4670.443	-17.5384	-1.2262	-1.1157	1.4324	-0.3521	-0.1102	0.5708
443	293.755	4670.424	-17.5574	-0.1887	-0.4	0.3549	0.4315	-0.2252	-0.2815
444	294.7777	4670.405	-17.5764	-0.916	-0.9512	1.1463	0.031	-0.6669	-0.1142
445	295.8004	4670.386	-17.5953	-0.3162	-0.5134	0.6633	-0.6307	-0.6528	0.6142
446	296.8231	4670.367	-17.6143	0.742	0.6436	-0.4513	-0.8919	-0.4406	-0.4286
447	297.8458	4670.348	-17.6333	0.3456	0.1527	-0.3176	-0.7177	-0.5804	-0.6116
448	298.8685	4670.329	-17.6523	-0.3265	-0.5223	0.6001	-0.7177	-0.5486	0.0543
449	299.8912	4670.31	-17.6713	0.3904	0.2047	-0.2953	-0.3172	-0.1485	0.5789
450	300.9139	4670.291	-17.6902	0.649	0.5222	-0.5702	-0.6829	-0.1656	-0.0835
451	301.9365	4670.272	-17.7092	0.3629	0.1726	-0.1578	-0.5436	-0.2974	-0.0738
452	302.9592	4670.253	-17.7282	-0.33	-0.5252	0.5296	-0.2824	-0.6584	-0.4215
453	303.9819	4670.234	-17.7472	0.5525	0.4002	-0.4736	-0.3172	-0.6584	-0.4322

454	305.0046	4670.215	-17.7662	0.7938	0.7127	-0.8006	0.2225	-0.1607	-0.6501
455	306.0272	4670.196	-17.7851	-0.1266	-0.3422	0.1766	0.1181	-0.2229	-0.1555
456	307.0499	4670.177	-17.8041	1.2453	1.3661	-1.0904	-0.3172	-0.0875	0.4397
457	308.0726	4670.158	-17.8231	0.2215	0.0132	-0.4476	-0.8396	-0.3707	-0.5626
458	309.0952	4670.139	-17.8421	1.366	1.5558	-1.0904	-0.8919	-0.2801	0.0846
459	310.1179	4670.12	-17.8611	-0.037	-0.2558	0.3141	-0.77	-1.0896	0.5357
460	258.9999	4672.092	-15.8891	0.6731	0.5533	-0.4104	-0.7874	-1.5146	0.1906
461	260.0228	4672.073	-15.9081	-0.8333	-0.9002	1.2764	-0.8048	-1.1454	0.6241
462	261.0456	4672.054	-15.9271	0.9592	0.9417	-0.7337	-0.2998	-0.9261	0.0997
463	262.0684	4672.035	-15.9461	1.0247	1.0357	-0.8191	-0.5088	-0.8787	-0.4152
464	263.0912	4672.016	-15.965	0.1388	-0.0761	0.1543	-0.2476	-0.4714	0.4379
465	264.114	4671.997	-15.984	-0.9815	-0.9894	1.1872	0.2748	-0.1905	-0.6961
466	265.1368	4671.978	-16.003	-0.1611	-0.3745	0.5518	-0.8396	0.2487	0.7149
467	266.1596	4671.959	-16.022	-0.3817	-0.5689	0.6224	-0.0735	0.0856	0.0293
468	267.1824	4671.94	-16.041	-0.2231	-0.4313	0.6001	-0.561	0.4264	0.3338
469	268.2052	4671.921	-16.06	0.7765	0.6895	-0.7634	0.2922	1.5911	0.172
470	269.228	4671.902	-16.079	-1.533	-1.2369	0.459	0.4837	2.1204	-0.4534
471	270.2508	4671.883	-16.098	0.9454	0.9222	-0.8823	-0.1779	1.7334	-0.1011
472	271.2736	4671.864	-16.117	-1.3607	-1.1739	1.6442	-0.5262	0.42	0.7451
473	272.2963	4671.845	-16.1359	-0.1749	-0.3873	0.2472	0.536	-0.1804	-0.4729
474	273.3191	4671.826	-16.1549	0.032	-0.1869	-0.3027	1.6678	-0.2341	-0.2313
475	274.3419	4671.807	-16.1739	-0.5058	-0.6688	0.5333	-0.0038	-0.0732	0.0996
476	275.3647	4671.788	-16.1929	-0.885	-0.9324	1.0163	0.1007	0.1458	0.432
477	276.3874	4671.769	-16.2119	-0.2266	-0.4344	0.158	0.9539	-0.0746	0.2289
478	277.4102	4671.75	-16.2309	1.4108	1.6279	-1.3504	0.2399	-0.3196	-0.3838
479	278.433	4671.731	-16.2499	1.2763	1.4143	-1.0755	-0.4914	-0.2799	-0.6109
480	279.4557	4671.712	-16.2689	0.5111	0.3492	-0.3361	-0.8048	-0.276	-0.4729
481	280.4785	4671.693	-16.2878	1.4039	1.6167	-1.1721	-0.5262	-0.2246	0.5086
482	281.5012	4671.674	-16.3068	1.0936	1.1367	-1.0309	0.2922	-0.338	0.3069
483	282.524	4671.655	-16.3258	-0.0956	-0.3127	0.2472	-0.5262	-0.8184	-0.703
484	283.5467	4671.636	-16.3448	1.6762	2.0729	-1.3802	-0.8396	-1.0964	0.3645

485	284.5695	4671.617	-16.3638	1.6383	2.0074	-1.4359	-0.4565	-1.0249	0.5427
486	285.5922	4671.598	-16.3828	0.2457	0.0398	-0.195	0.2051	-0.3863	0.3186
487	286.6149	4671.579	-16.4018	-1.5296	-1.2358	1.7259	-0.4043	0.0603	0.4966
488	287.6377	4671.56	-16.4208	-0.1576	-0.3713	0.262	0.0484	-0.0627	-0.1386
489	288.6604	4671.541	-16.4397	0.842	0.7783	-0.8637	0.7623	-0.3132	-0.1709
490	289.6831	4671.522	-16.4587	-0.7816	-0.8668	0.6967	1.128	-0.32	0.4102
491	290.7058	4671.503	-16.4777	0.2181	0.0094	-0.4402	1.5981	-0.382	-0.2742
492	291.7285	4671.484	-16.4967	-0.5127	-0.6742	0.4218	0.2225	-0.319	-0.1896
493	292.7513	4671.465	-16.5157	-0.8746	-0.926	0.7228	0.7623	-0.4028	-0.0532
494	293.774	4671.446	-16.5347	-0.1404	-0.3552	0.4181	-0.5436	-0.8372	0.4316
495	294.7967	4671.427	-16.5536	0.742	0.6436	-0.5814	-0.0909	-0.7342	0.0002
496	295.8194	4671.408	-16.5726	-0.3679	-0.5573	0.5333	-0.1605	-0.4684	0.3937
497	296.8421	4671.389	-16.5916	-0.9332	-0.9614	1.1389	-0.265	-0.6064	-0.6312
498	297.8648	4671.371	-16.6106	-0.2128	-0.422	0.5927	-0.7874	-0.5289	-0.1304
499	298.8875	4671.352	-16.6296	-0.8781	-0.9282	1.2578	-0.8396	-0.6514	0.1598
500	299.9102	4671.333	-16.6486	-0.0784	-0.2961	0.3438	-0.6133	-0.4049	0.5048
501	300.9328	4671.314	-16.6676	-0.2369	-0.4437	0.4515	-0.8048	-0.1883	-0.0113
502	301.9555	4671.295	-16.6865	-0.5368	-0.6927	0.6336	-0.2302	-0.4369	-0.2132
503	302.9782	4671.276	-16.7055	-0.8574	-0.9153	1.2838	-0.7177	-0.4016	-0.0807
504	304.0009	4671.257	-16.7245	0.7041	0.5937	-0.4216	-0.6655	-0.0789	0.1979
505	305.0236	4671.238	-16.7435	0.8799	0.8305	-0.678	-0.3172	0.2476	0.4887
506	306.0462	4671.219	-16.7625	-0.0749	-0.2928	0.2286	-0.6655	0.4163	0.3352
507	307.0689	4671.2	-16.7814	0.4973	0.3324	-0.4699	-0.5958	0.0764	-0.1789
508	308.0916	4671.181	-16.8004	0.5318	0.3746	-0.5479	-0.561	-0.2357	-0.331
509	309.1142	4671.162	-16.8194	0.3422	0.1487	0.0688	-0.8919	-0.218	0.1994
510	310.1369	4671.143	-16.8384	-1.3745	-1.1794	1.7816	-0.857	-0.9726	0.4717
511	259.0189	4673.115	-14.8663	-0.7953	-0.8758	0.7934	0.7797	-1.5276	-0.5374
512	260.0417	4673.096	-14.8853	0.8765	0.8257	-0.6222	-0.3521	-1.0524	0.0524
513	261.0646	4673.077	-14.9043	0.0492	-0.1694	0.0614	0.4837	-0.7993	0.5648
514	262.0874	4673.058	-14.9232	-0.3955	-0.5803	0.5927	-0.0038	-0.6978	-0.307
515	263.1102	4673.039	-14.9422	-0.4851	-0.6526	0.7302	-0.474	-0.3162	0.6861

516	264.133	4673.02	-14.9612	-0.3059	-0.5045	0.4515	0.2399	-0.1616	-0.4942
517	265.1558	4673.001	-14.9802	0.7593	0.6665	-0.7114	0.4141	0.2685	-0.236
518	266.1786	4672.982	-14.9992	-0.7092	-0.818	1.0906	-0.8919	0.2539	0.5838
519	267.2014	4672.963	-15.0182	-1.5503	-1.2425	1.9674	-0.8919	0.0718	0.5709
520	268.2242	4672.944	-15.0372	-0.1714	-0.3841	0.4924	-0.6829	0.2738	-0.0573
521	269.247	4672.925	-15.0562	-0.3714	-0.5602	-0.2024	1.7722	0.7852	-0.2304
522	270.2698	4672.906	-15.0752	0.2043	-0.0057	-0.2804	0.6056	0.4298	-0.3645
523	271.2926	4672.887	-15.0942	0.5283	0.3704	-0.195	-0.8919	0.2613	0.443
524	272.3153	4672.868	-15.1132	-1.1228	-1.0655	1.3247	-0.3347	0.1424	0.5621
525	273.3381	4672.849	-15.1322	-1.471	-1.2158	1.124	2.2772	0.1097	-0.6128
526	274.3609	4672.83	-15.1512	0.387	0.2007	-0.4439	0.5882	0.0911	-0.1395
527	275.3837	4672.811	-15.1701	0.1181	-0.0979	0.2806	-0.857	0.0929	-0.2048
528	276.4064	4672.792	-15.1891	-0.2266	-0.4344	0.4255	-0.7351	-0.1077	0.3057
529	277.4292	4672.773	-15.2081	-0.0473	-0.266	0.1357	-0.3172	-0.397	0.7094
530	278.4519	4672.754	-15.2271	-0.3024	-0.5015	0.1506	0.8494	-0.3129	-0.1061
531	279.4747	4672.735	-15.2461	0.5525	0.4002	-0.3919	-0.5088	-0.0389	0.4245
532	280.4975	4672.716	-15.2651	1.6521	2.0312	-1.4359	-0.7526	-0.4743	-0.2698
533	281.5202	4672.697	-15.2841	1.6176	1.972	-1.4359	-0.3695	-0.8199	0.0118
534	282.543	4672.678	-15.3031	0.2732	0.0705	-0.2024	-0.8222	-0.9615	-0.5272
535	283.5657	4672.659	-15.3221	0.4628	0.2907	-0.1689	-0.6829	-1.0573	0.112
536	284.5884	4672.64	-15.3411	1.1316	1.1931	-1.0718	0.1181	-0.9614	-0.2318
537	285.6112	4672.621	-15.36	0.8972	0.8545	-1.0792	1.3369	-0.2922	-0.4293
538	286.6339	4672.602	-15.379	0.4663	0.2948	-0.4922	0.4663	-0.3918	0.5403
539	287.6566	4672.583	-15.398	0.6283	0.4957	-0.4587	0.0832	-0.7417	-0.015
540	288.6794	4672.564	-15.417	0.4732	0.3031	-0.4327	0.6927	-0.9071	-0.6321
541	289.7021	4672.545	-15.436	-0.0025	-0.2216	-0.1615	1.3021	-0.4568	0.5792
542	290.7248	4672.526	-15.455	-0.8919	-0.9366	0.9011	0.2574	-0.5507	-0.4446
543	291.7475	4672.507	-15.474	-1.1263	-1.0673	1.3841	0.3618	-0.5267	0.2057
544	292.7702	4672.488	-15.493	-1.5606	-1.2458	1.8151	-0.2302	-0.7729	0.625
545	293.793	4672.469	-15.512	0.2353	0.0284	-0.0018	-0.0561	-0.7	0.6804
546	294.8157	4672.45	-15.5309	-0.0611	-0.2794	0.3103	-0.3347	-0.6512	-0.2137

547	295.8384	4672.431	-15.5499	-1.2228	-1.1141	1.4213	-0.2824	-0.4253	-0.68
548	296.8611	4672.412	-15.5689	-0.4989	-0.6634	0.7228	-0.8396	-0.4672	-0.2422
549	297.8838	4672.393	-15.5879	0.0113	-0.2078	0.2509	-0.5784	-0.7032	0.1095
550	298.9065	4672.374	-15.6069	0.0078	-0.2113	0.1692	-0.474	-0.7665	0.3057
551	299.9291	4672.355	-15.6259	0.0664	-0.1517	0.1506	-0.77	-0.4928	-0.2668
552	300.9518	4672.336	-15.6449	1.0592	1.0859	-0.834	-0.7003	-0.0562	-0.4807
553	301.9745	4672.317	-15.6639	1.0902	1.1316	-1.0384	-0.0735	0.1872	0.2913
554	302.9972	4672.298	-15.6828	1.3418	1.5173	-1.3802	-0.2998	0.2518	0.3301
555	304.0199	4672.279	-15.7018	0.4973	0.3324	-0.481	-0.8396	0.2451	-0.0562
556	305.0425	4672.26	-15.7208	-0.2128	-0.422	0.0466	-0.5784	0.3144	-0.5464
557	306.0652	4672.241	-15.7398	-0.2921	-0.4925	0.3178	-0.4391	0.3805	-0.3646
558	307.0879	4672.222	-15.7588	0.5352	0.3789	-0.5256	-0.2476	0.0591	-0.3441
559	308.1105	4672.203	-15.7778	1.0247	1.0357	-0.7783	-0.77	-0.3012	0.1794
560	309.1332	4672.184	-15.7968	0.3767	0.1886	-0.1467	-0.4391	-0.4727	0.3667
561	310.1559	4672.165	-15.8157	-1.0815	-1.0442	1.3284	-0.8919	-0.9449	0.4628
562	259.0379	4674.138	-13.8434	0.1664	-0.0467	0.0057	-0.1605	-1.4293	-0.354
563	260.0607	4674.119	-13.8624	0.2112	0.0019	-0.1132	-0.1779	-1.1285	-0.5069
564	261.0836	4674.1	-13.8814	1.1143	1.1674	-0.8823	-0.4565	-0.7308	0.5738
565	262.1064	4674.081	-13.9004	0.8834	0.8353	-0.6631	-0.4565	-0.9544	-0.29
566	263.1292	4674.062	-13.9194	-1.3021	-1.1495	1.7371	-0.6481	-0.7564	0.3
567	264.152	4674.043	-13.9384	-1.2986	-1.148	1.6962	-0.8222	-0.443	-0.4489
568	265.1748	4674.024	-13.9574	0.9523	0.932	-1.0123	0.9713	0.1249	0.2967
569	266.1976	4674.005	-13.9764	-0.037	-0.2558	0.0391	0.2748	0.2331	-0.2224
570	267.2204	4673.986	-13.9954	-1.2021	-1.1044	1.4844	-0.5784	-0.0989	0.0421
571	268.2432	4673.967	-14.0144	-0.6885	-0.8037	0.8825	0.1529	-0.3199	0.2702
572	269.266	4673.948	-14.0334	0.287	0.086	-0.6185	1.3543	-0.3773	-0.612
573	270.2888	4673.929	-14.0524	-0.5368	-0.6927	0.3252	1.2673	-0.1193	0.3293
574	271.3115	4673.91	-14.0714	-0.4575	-0.6307	0.537	0.2574	0.0396	-0.4615
575	272.3343	4673.891	-14.0904	-1.4434	-1.2058	1.6702	-0.1605	0.057	0.5011
576	273.3571	4673.872	-14.1094	-1.5399	-1.2392	1.6219	0.2922	-0.0106	0.753
577	274.3799	4673.853	-14.1284	-0.4472	-0.6225	0.3475	0.7101	0.058	-0.3802

578	275.4026	4673.834	-14.1474	-0.8505	-0.911	1.0757	-0.2824	0.0748	0.7226
579	276.4254	4673.815	-14.1664	0.5662	0.4174	-0.507	-0.0387	0.0075	-0.0196
580	277.4482	4673.796	-14.1854	1.1247	1.1828	-0.9789	-0.1954	-0.02	0.3812
581	278.4709	4673.777	-14.2044	0.3112	0.1133	-0.1689	-0.1431	0.0285	0.5579
582	279.4937	4673.758	-14.2234	1.0385	1.0557	-0.8006	-0.3695	0.012	0.6094
583	280.5165	4673.739	-14.2423	1.4487	1.6896	-1.4359	0.4663	-0.5233	0.5345
584	281.5392	4673.72	-14.2613	1.5521	1.861	-1.4359	-0.0387	-0.7424	0.5686
585	282.5619	4673.701	-14.2803	0.7834	0.6988	-0.4848	-0.6655	-0.4884	0.2362
586	283.5847	4673.682	-14.2993	-1.7226	-1.2912	1.8374	-0.77	-0.5618	-0.6105
587	284.6074	4673.663	-14.3183	1.0592	1.0859	-1.0161	0.2574	-0.6428	0.0652
588	285.6302	4673.644	-14.3373	1.4384	1.6727	-1.3059	-0.1779	-0.6078	0.2
589	286.6529	4673.625	-14.3563	0.8213	0.7501	-0.6297	-0.6655	-0.74	0.7293
590	287.6756	4673.606	-14.3753	1.5383	1.8379	-1.3244	-0.474	-1.1554	0.3317
591	288.6984	4673.587	-14.3943	0.9627	0.9466	-1.3393	2.2075	-0.9097	-0.3138
592	289.7211	4673.568	-14.4133	0.8075	0.7313	-1.0458	0.9713	-0.1062	-0.2974
593	290.7438	4673.549	-14.4323	-0.4955	-0.6607	0.5481	-0.7003	-0.0127	-0.3074
594	291.7665	4673.53	-14.4513	-0.3748	-0.5631	0.4552	-0.0038	-0.3155	-0.107
595	292.7892	4673.511	-14.4703	0.5662	0.4174	-0.3659	-0.561	-0.8801	0.0252
596	293.8119	4673.492	-14.4892	1.0454	1.0658	-0.9083	-0.4391	-0.9503	-0.5181
597	294.8346	4673.473	-14.5082	0.1457	-0.0688	-0.1095	0.0658	-0.8761	-0.5293
598	295.8574	4673.454	-14.5272	-0.3783	-0.566	0.5035	0.536	-0.4153	-0.2247
599	296.8801	4673.435	-14.5462	0.8627	0.8067	-0.6036	-0.7003	-0.5255	0.3494
600	297.9027	4673.416	-14.5652	-0.3024	-0.5015	0.6187	-0.561	-0.8308	0.3771
601	298.9254	4673.397	-14.5842	0.0906	-0.1268	0.2323	-0.4565	-0.5958	0.2143
602	299.9481	4673.378	-14.6032	-0.0129	-0.2319	0.2435	-0.77	-0.3487	-0.1703
603	300.9708	4673.359	-14.6222	-0.3265	-0.5223	0.6745	-0.8222	0.2953	0.7205
604	301.9935	4673.34	-14.6412	0.811	0.736	-0.8897	0.1007	0.7002	0.2486
605	303.0162	4673.321	-14.6602	-0.0921	-0.3094	-0.0686	0.3967	0.46	-0.6113
606	304.0389	4673.302	-14.6792	1.1385	1.2034	-1.1127	-0.0038	0.3552	0.0168
607	305.0615	4673.283	-14.6981	1.4728	1.7291	-1.187	-0.8744	0.2987	0.1818
608	306.0842	4673.264	-14.7171	1.5038	1.7804	-1.3839	-0.7351	0.1122	-0.3565

609	307.1069	4673.245	-14.7361	0.194	-0.0169	0.0688	-0.5436	-0.1592	0.5088
610	308.1295	4673.226	-14.7551	0.8179	0.7454	-0.5145	-0.7526	-0.6448	-0.1836
611	309.1522	4673.207	-14.7741	0.7214	0.6163	-0.5702	-0.1605	-0.8059	-0.2796
612	310.1748	4673.188	-14.7931	0.2595	0.0551	-0.6817	-0.7526	-1.1082	-0.0499
613	259.0569	4675.16	-12.8206	1.297	1.4466	-1.2538	-0.1431	-1.4022	0.0457
614	260.0797	4675.141	-12.8396	-1.371	-1.1781	1.607	0.1877	-1.0208	-0.4469
615	261.1026	4675.122	-12.8586	0.5766	0.4303	-0.3324	-0.8396	-0.7806	-0.1976
616	262.1254	4675.103	-12.8776	1.4246	1.6502	-1.3542	0.2574	-0.9951	0.5678
617	263.1482	4675.084	-12.8966	0.6042	0.465	-0.4959	0.4489	-1.1071	0.4919
618	264.171	4675.065	-12.9156	0.2526	0.0474	0.0503	-0.474	-0.6523	-0.0808
619	265.1938	4675.046	-12.9346	-0.5403	-0.6954	0.8454	-0.8919	-0.2189	-0.5033
620	266.2166	4675.027	-12.9536	-0.8677	-0.9218	1.1092	-0.265	-0.0036	0.1452
621	267.2394	4675.008	-12.9726	-2.0018	-1.3425	2.4393	-0.8222	-0.3413	0.5713
622	268.2622	4674.989	-12.9916	-0.6299	-0.762	1.0534	-0.6655	-0.5235	0.369
623	269.285	4674.97	-13.0106	0.7007	0.5892	-0.6259	-0.8919	-0.5879	-0.6405
624	270.3078	4674.951	-13.0296	0.3973	0.2128	-0.403	0.4663	-0.2372	0.8101
625	271.3305	4674.932	-13.0486	-0.7057	-0.8156	0.3698	2.2075	-0.3353	-0.6326
626	272.3533	4674.913	-13.0676	-0.23	-0.4375	0.3364	0.1877	-0.3023	-0.0836
627	273.3761	4674.894	-13.0866	-0.2817	-0.4834	0.1209	1.7374	-0.2531	-0.1819
628	274.3989	4674.876	-13.1056	-0.2714	-0.4743	0.0503	0.7623	-0.2026	0.1699
629	275.4216	4674.857	-13.1246	0.3008	0.1015	-0.8043	1.4066	-0.0955	-0.2812
630	276.4444	4674.838	-13.1436	0.325	0.129	-0.2024	-0.0735	-0.4357	-0.2146
631	277.4672	4674.819	-13.1626	-0.0818	-0.2994	-0.2135	2.4165	-0.4935	-0.4051
632	278.4899	4674.8	-13.1816	0.3456	0.1527	-0.3101	0.1355	-0.6052	-0.6377
633	279.5127	4674.781	-13.2006	0.6352	0.5045	-0.7002	0.6404	-0.4989	-0.5226
634	280.5354	4674.762	-13.2196	1.1316	1.1931	-0.99	-0.5784	-0.7792	-0.5495
635	281.5582	4674.743	-13.2386	0.6214	0.4869	-0.5442	-0.0038	-0.8514	-0.5586
636	282.5809	4674.724	-13.2576	-0.2059	-0.4157	0.433	-0.474	-0.4506	-0.4036
637	283.6037	4674.705	-13.2766	-1.3848	-1.1835	1.4435	-0.8222	-0.5334	-0.5427
638	284.6264	4674.686	-13.2956	1.5762	1.9017	-1.3133	-0.6829	-0.5049	0.0142
639	285.6492	4674.667	-13.3146	0.5111	0.3492	-0.2135	-0.7526	-0.6546	0.5749

640	286.6719	4674.648	-13.3336	1.0695	1.1011	-0.8266	-0.77	-0.8154	-0.5726
641	287.6946	4674.629	-13.3526	1.721	2.1511	-1.4322	-0.8222	-0.8805	0.1484
642	288.7174	4674.61	-13.3716	1.0109	1.0158	-1.2093	1.5633	-0.397	0.0844
643	289.7401	4674.591	-13.3906	0.1423	-0.0724	-0.481	0.8668	0.0206	-0.4114
644	290.7628	4674.572	-13.4096	0.3112	0.1133	-0.2655	-0.0387	-0.0075	-0.0215
645	291.7855	4674.553	-13.4285	-0.8677	-0.9218	0.7116	1.6155	-0.238	0.3443
646	292.8082	4674.534	-13.4475	0.6869	0.5712	-0.5628	-0.4391	-0.7632	-0.388
647	293.8309	4674.515	-13.4665	1.2315	1.3448	-0.9529	-0.6655	-0.8246	0.5084
648	294.8536	4674.496	-13.4855	0.1285	-0.087	0.0614	-0.1083	-0.7514	0.3784
649	295.8763	4674.477	-13.5045	0.3836	0.1967	-0.5553	1.0931	-0.5358	-0.4152
650	296.899	4674.458	-13.5235	0.4939	0.3282	-0.4513	0.2399	-0.5783	0.374
651	297.9217	4674.439	-13.5425	0.1733	-0.0393	0.0986	-0.6655	-0.686	-0.0552
652	298.9444	4674.42	-13.5615	0.5387	0.3831	-0.403	-0.1257	-0.4317	0.0892
653	299.9671	4674.401	-13.5805	1.459	1.7065	-1.2241	-0.4914	0.169	0.5682
654	300.9898	4674.382	-13.5995	0.9799	0.9712	-1.2538	0.6578	0.451	-0.3604
655	302.0125	4674.363	-13.6185	0.0733	-0.1446	-0.481	0.536	0.3713	-0.5805
656	303.0352	4674.344	-13.6375	1.3384	1.5119	-1.2093	-0.8919	0.1217	0.0093
657	304.0578	4674.325	-13.6565	1.5556	1.8668	-1.2761	-0.8919	-0.2637	0.5667
658	305.0805	4674.306	-13.6755	1.3832	1.5834	-1.1833	-0.8919	-0.5134	-0.2242
659	306.1032	4674.287	-13.6945	1.6107	1.9602	-1.4359	-0.7177	-0.2165	-0.1936
660	307.1259	4674.268	-13.7135	0.0974	-0.1196	0.0057	-0.3347	-0.314	0.1525
661	308.1485	4674.249	-13.7324	-0.5127	-0.6742	0.7971	-0.0909	-0.3972	0.7506
662	309.1712	4674.23	-13.7514	-0.2955	-0.4955	0.5927	-0.7003	-0.8141	0.035
663	310.1938	4674.211	-13.7704	-0.3334	-0.5282	0.6447	-0.6829	-1.2322	0.7236
664	259.0759	4676.183	-11.7978	1.0178	1.0257	-1.3653	1.9115	-1.5598	-0.5396
665	260.0987	4676.164	-11.8168	1.073	1.1062	-0.9232	0.0484	-1.2391	0.5362
666	261.1216	4676.145	-11.8358	-0.5092	-0.6715	0.5407	0.1703	-1.1977	-0.6981
667	262.1444	4676.126	-11.8548	1.7245	2.1571	-1.4359	-0.8919	-1.107	-0.1178
668	263.1672	4676.107	-11.8738	1.4797	1.7405	-1.3616	-0.0212	-1.1788	0.6959
669	264.19	4676.088	-11.8928	-0.2955	-0.4955	0.3772	0.1181	-0.8119	0.1232
670	265.2128	4676.069	-11.9118	-1.1194	-1.0638	1.2912	0.1181	-0.28	-0.425

671	266.2356	4676.05	-11.9308	-0.6954	-0.8085	0.8379	0.7449	-0.0408	0.1224
672	267.2584	4676.031	-11.9498	-0.5575	-0.7085	0.8417	-0.1954	-0.3013	0.4295
673	268.2812	4676.012	-11.9688	-0.5851	-0.7291	0.9048	-0.6133	-0.4214	0.1355
674	269.304	4675.993	-11.9878	0.4732	0.3031	-0.6557	0.6578	-0.3621	-0.5642
675	270.3268	4675.974	-12.0068	0.9868	0.9811	-0.912	0.4489	-0.2498	0.3337
676	271.3495	4675.955	-12.0258	-0.1094	-0.3259	-0.0278	1.0235	-0.4927	-0.1145
677	272.3723	4675.936	-12.0448	-0.5161	-0.6768	0.4367	1.3369	-0.5056	-0.3345
678	273.3951	4675.917	-12.0638	-0.6058	-0.7444	0.7711	-0.1954	-0.4858	0.5894
679	274.4179	4675.898	-12.0828	-0.654	-0.7793	0.7599	-0.1257	-0.492	0.1929
680	275.4406	4675.879	-12.1018	0.6662	0.5444	-0.7708	0.7275	-0.0029	0.6108
681	276.4634	4675.86	-12.1208	0.4215	0.2413	-0.4587	-0.1779	-0.3643	0.48
682	277.4862	4675.841	-12.1398	0.9833	0.9761	-0.8526	0.1877	-0.4635	-0.3452
683	278.5089	4675.822	-12.1588	1.1281	1.1879	-0.9938	0.0484	-0.5965	0.169
684	279.5317	4675.803	-12.1778	0.9523	0.932	-1.0718	1.3717	-0.4484	0.1406
685	280.5544	4675.784	-12.1968	1.3866	1.5889	-1.4359	0.8146	-0.524	0.0689
686	281.5772	4675.765	-12.2158	0.1457	-0.0688	0.1803	-0.8919	-0.6107	0.3343
687	282.5999	4675.746	-12.2348	-1.3986	-1.1889	1.7854	-0.8919	-0.6978	0.5042
688	283.6227	4675.727	-12.2538	-0.7471	-0.8438	0.8602	-0.8919	-0.7359	-0.4621
689	284.6454	4675.708	-12.2728	0.9316	0.9027	-0.7151	-0.8919	-0.8479	-0.153
690	285.6682	4675.689	-12.2918	1.3177	1.4791	-1.2204	-0.1431	-0.8582	0.1449
691	286.6909	4675.67	-12.3108	0.0802	-0.1375	0.2212	-0.857	-0.7321	0.7013
692	287.7136	4675.651	-12.3298	1.6831	2.0849	-1.4248	-0.7003	-0.7326	-0.1184
693	288.7363	4675.632	-12.3488	0.0837	-0.1339	-0.4216	1.2499	-0.6309	-0.7108
694	289.7591	4675.613	-12.3678	1.2694	1.4035	-1.2724	0.6578	-0.1333	0.1728
695	290.7818	4675.594	-12.3868	0.9833	0.9761	-1.2167	1.7896	-0.197	0.1396
696	291.8045	4675.575	-12.4058	-0.6747	-0.794	0.6336	1.0409	-0.3641	0.4954
697	292.8272	4675.556	-12.4248	-0.5023	-0.6661	0.6076	0.7623	-0.4658	-0.5383
698	293.8499	4675.537	-12.4438	0.8351	0.7688	-0.7931	0.536	-0.6137	0.3757
699	294.8726	4675.518	-12.4628	1.3832	1.5834	-1.213	-0.5436	-0.6555	0.1814
700	295.8953	4675.499	-12.4818	0.2181	0.0094	-0.1615	-0.1954	-0.3285	-0.4402
701	296.918	4675.48	-12.5008	1.559	1.8726	-1.4359	-0.0561	-0.3004	0.6479

702	297.9407	4675.461	-12.5198	0.9661	0.9515	-0.8451	-0.0735	-0.0997	-0.4947
703	298.9634	4675.442	-12.5388	0.7524	0.6573	-0.5293	-0.8919	-0.1448	-0.3432
704	299.9861	4675.423	-12.5578	1.0213	1.0307	-0.86	-0.8919	0.1076	-0.3003
705	301.0088	4675.404	-12.5768	0.3939	0.2088	-0.6111	0.1529	0.0187	-0.3113
706	302.0315	4675.385	-12.5958	1.7072	2.1269	-1.4359	-0.8919	-0.2553	0.5067
707	303.0542	4675.366	-12.6148	1.2763	1.4143	-0.9975	-0.7003	-0.4545	-0.2412
708	304.0768	4675.347	-12.6338	0.2664	0.0628	-0.1987	-0.0212	-0.7635	-0.028
709	305.0995	4675.328	-12.6528	1.1764	1.2606	-1.0532	-0.4043	-0.3004	0.5838
710	306.1222	4675.309	-12.6718	1.4487	1.6896	-1.4359	-0.0212	-0.2159	-0.5081
711	307.1448	4675.29	-12.6908	-0.7299	-0.8322	1.0051	-0.2998	-0.1054	0.3868
712	308.1675	4675.271	-12.7098	-0.4506	-0.6252	0.7562	-0.6829	-0.0573	0.5008
713	309.1902	4675.252	-12.7288	-0.7333	-0.8345	0.9085	-0.5436	-0.2683	0.1196
714	310.2128	4675.233	-12.7478	-0.4575	-0.6307	0.6782	-0.6829	-1.1483	0.1243
715	259.0949	4677.206	-10.775	0.6111	0.4738	-0.5925	0.4489	-1.6837	-0.0832
716	260.1177	4677.187	-10.794	0.5869	0.4433	-0.3101	-0.6133	-1.3866	0.3615
717	261.1406	4677.168	-10.813	1.6969	2.1089	-1.4359	-0.7526	-1.0303	-0.1829
718	262.1634	4677.149	-10.832	1.5556	1.8668	-1.4359	-0.0735	-0.953	-0.7054
719	263.1862	4677.13	-10.851	1.5624	1.8784	-1.3876	-0.6307	-0.7902	0.334
720	264.209	4677.111	-10.87	-0.5265	-0.6848	0.8491	-0.2302	-0.6133	0.5816
721	265.2318	4677.092	-10.889	-0.7885	-0.8713	1.1389	-0.3347	-0.5412	-0.4187
722	266.2546	4677.073	-10.908	-1.0883	-1.0478	1.2541	0.5185	-0.4487	-0.4445
723	267.2774	4677.054	-10.927	-1.7536	-1.2986	2.2461	-0.8222	-0.4431	0.0842
724	268.3002	4677.035	-10.946	-1.0332	-1.0183	1.4361	-0.7874	0.0179	0.5248
725	269.323	4677.016	-10.965	0.1836	-0.0281	-0.4439	0.2748	-0.1189	-0.6723
726	270.3458	4676.997	-10.984	1.3143	1.4737	-1.3616	0.7971	-0.1808	0.4011
727	271.3685	4676.978	-11.0031	0.4077	0.225	-0.3287	0.3967	-0.3798	0.5555
728	272.3913	4676.959	-11.0221	-0.6781	-0.7964	0.3289	2.1379	-0.5452	-0.4934
729	273.4141	4676.94	-11.0411	-0.2369	-0.4437	0.2212	1.1802	-0.4817	-0.0059
730	274.4369	4676.921	-11.0601	0.156	-0.0577	-0.1132	0.0832	-0.499	-0.0514
731	275.4596	4676.902	-11.0791	-0.4024	-0.586	0.2843	0.6753	-0.4202	-0.5506
732	276.4824	4676.883	-11.0981	-1.2469	-1.1252	1.3469	0.0484	-0.4676	0.4283

733	277.5052	4676.864	-11.1171	-1.4951	-1.2242	1.7779	-0.6481	-0.7999	0.7024
734	278.5279	4676.845	-11.1361	-0.4782	-0.6472	0.5333	0.3967	-0.9463	0.5643
735	279.5507	4676.826	-11.1551	-0.3197	-0.5164	0.4924	-0.3347	-0.8763	0.5593
736	280.5734	4676.807	-11.1741	-0.299	-0.4985	0.3586	0.2399	-0.7995	0.4654
737	281.5962	4676.788	-11.1931	0.1078	-0.1088	0.1989	-0.857	-1.0283	0.4308
738	282.6189	4676.769	-11.2121	1.4039	1.6167	-1.0904	-0.8222	-1.1702	-0.239
739	283.6417	4676.75	-11.2311	-0.4265	-0.6057	0.5816	-0.8919	-1.2735	-0.3666
740	284.6644	4676.731	-11.2501	0.6869	0.5712	-0.3621	-0.8919	-1.003	-0.2926
741	285.6872	4676.712	-11.2691	1.528	1.8206	-1.4322	-0.0561	-0.9311	0.1978
742	286.7099	4676.693	-11.2881	1.4487	1.6896	-1.4359	0.3792	-0.6947	0.5405
743	287.7326	4676.674	-11.3071	0.6766	0.5577	-0.6334	-0.1431	-0.7581	-0.5505
744	288.7553	4676.655	-11.3261	1.0109	1.0158	-0.8823	-0.3869	-0.7488	0.2092
745	289.7781	4676.636	-11.3451	1.1798	1.2658	-1.2278	0.6056	-1.0245	-0.3751
746	290.8008	4676.617	-11.3641	0.8592	0.8019	-1.2613	2.1205	-0.9737	-0.1948
747	291.8235	4676.598	-11.3831	-0.7609	-0.8531	1.0646	-0.5088	-0.3395	0.4804
748	292.8462	4676.579	-11.4021	-1.5123	-1.2301	1.7928	-0.4914	-0.1549	0.3222
749	293.8689	4676.56	-11.4211	-0.9849	-0.9914	1.1575	-0.3869	-0.3395	0.0241
750	294.8916	4676.541	-11.4401	-0.9677	-0.9815	1.1872	-0.77	-0.4599	0.6224
751	295.9143	4676.522	-11.4591	-0.2197	-0.4282	0.1877	-0.0735	-0.1662	-0.1826
752	296.937	4676.503	-11.4781	0.7627	0.6711	-0.4439	-0.8919	-0.3046	0.089
753	297.9597	4676.484	-11.4971	1.3005	1.452	-1.2501	-0.1257	-0.6055	-0.2527
754	298.9824	4676.465	-11.5161	-0.1887	-0.4	0.459	-0.8396	-0.3568	0.5986
755	300.0051	4676.446	-11.5351	0.9902	0.986	-0.7931	-0.8048	-0.3524	-0.1494
756	301.0278	4676.427	-11.5541	0.8248	0.7547	-0.7448	-0.77	-0.4262	0.0343
757	302.0505	4676.408	-11.5731	0.9764	0.9663	-0.7746	-0.8919	-0.9267	-0.034
758	303.0732	4676.389	-11.5921	1.0316	1.0457	-0.756	-0.6481	-0.6143	0.1751
759	304.0958	4676.37	-11.6111	0.6524	0.5266	-0.5888	-0.4565	-0.4233	-0.5384
760	305.1185	4676.351	-11.6301	0.4594	0.2865	-0.3324	-0.6307	0.0687	0.2234
761	306.1412	4676.332	-11.6491	1.2522	1.3768	-1.2353	-0.2998	-0.2175	-0.5841
762	307.1638	4676.313	-11.6681	-1.0194	-1.0107	1.503	-0.8919	0.1561	0.4285
763	308.1865	4676.294	-11.6871	-0.8091	-0.8847	1.0051	-0.4391	0.4151	-0.2996

764	309.2092	4676.275	-11.7061	0.3663	0.1766	-0.325	-0.5784	0.2092	-0.4488
765	310.2318	4676.256	-11.7251	0.7283	0.6254	-0.9195	0.623	-0.6369	-0.3706
766	259.1139	4678.229	-9.75216	-0.9574	-0.9755	1.3358	-0.7177	-1.2283	0.4544
767	260.1368	4678.21	-9.77117	0.3043	0.1054	-0.0426	-0.6481	-0.9919	-0.222
768	261.1596	4678.191	-9.79018	1.7038	2.1209	-1.4359	-0.8919	-0.6255	0.4378
769	262.1824	4678.172	-9.80919	1.6245	1.9838	-1.4359	-0.5262	-0.7852	-0.3094
770	263.2052	4678.153	-9.8282	1.0282	1.0407	-0.8972	0.1355	-0.6975	-0.2584
771	264.228	4678.134	-9.84721	1.4142	1.6335	-1.2761	-0.0387	-0.5943	0.4933
772	265.2508	4678.115	-9.86622	-0.7023	-0.8133	1.0794	-0.77	-0.9014	0.5034
773	266.2736	4678.096	-9.88523	1.0454	1.0658	-0.7708	-0.5784	-0.3758	0.4927
774	267.2964	4678.077	-9.90424	-0.3576	-0.5486	0.3809	0.3444	-0.1638	0.4218
775	268.3192	4678.058	-9.92325	-0.1266	-0.3422	0.4813	-0.8919	0.1744	-0.1992
776	269.342	4678.039	-9.94226	0.6042	0.465	-1.1312	1.511	0.301	-0.3989
777	270.3648	4678.02	-9.96127	0.8489	0.7877	-0.6371	-0.4565	-0.2292	0.4273
778	271.3876	4678.001	-9.98028	0.6145	0.4781	-0.4773	0.1877	-0.3565	0.659
779	272.4103	4677.982	-9.99928	-0.5368	-0.6927	0.3178	1.6329	-0.3798	-0.2308
780	273.4331	4677.963	-10.0183	-0.2197	-0.4282	0.4552	-0.2476	-0.3379	0.5668
781	274.4559	4677.944	-10.0373	-1.4675	-1.2145	1.8968	-0.5262	-0.3427	0.6535
782	275.4787	4677.925	-10.0563	0.4801	0.3115	-0.2655	-0.2998	-0.432	-0.4696
783	276.5014	4677.906	-10.0753	0.3008	0.1015	-0.3621	1.0409	-0.2071	0.2695
784	277.5242	4677.887	-10.0943	0.449	0.2741	-0.5033	0.7971	-0.5291	0.2372
785	278.5469	4677.868	-10.1133	0.2009	-0.0094	0.028	0.031	-0.7035	0.09
786	279.5697	4677.849	-10.1323	0.9592	0.9417	-1.1052	1.511	-0.5871	-0.4608
787	280.5925	4677.83	-10.1513	1.6521	2.0312	-1.4359	-0.5784	-0.5592	-0.1541
788	281.6152	4677.811	-10.1703	1.5762	1.9017	-1.343	-0.5784	-0.8725	0.3359
789	282.6379	4677.792	-10.1894	1.621	1.9779	-1.4359	-0.4043	-1.1651	0.6788
790	283.6607	4677.773	-10.2084	0.387	0.2007	-0.1281	-0.5436	-1.2505	0.1015
791	284.6834	4677.754	-10.2274	0.9351	0.9076	-0.8526	-0.8744	-0.7999	-0.5069
792	285.7062	4677.735	-10.2464	1.5245	1.8148	-1.3727	-0.2476	-0.7553	0.7376
793	286.7289	4677.716	-10.2654	1.721	2.1511	-1.4359	-0.8048	-0.4544	-0.1995
794	287.7516	4677.697	-10.2844	-0.2955	-0.4955	0.132	0.3967	-0.871	-0.596

795	288.7744	4677.678	-10.3034	0.5145	0.3534	-0.351	-0.1605	-0.955	0.2917
796	289.7971	4677.659	-10.3224	1.2384	1.3554	-1.1387	0.2399	-1.2801	0.7217
797	290.8198	4677.64	-10.3414	1.6521	2.0312	-1.4062	-0.5958	-0.9837	0.481
798	291.8425	4677.621	-10.3604	0.6042	0.465	-0.5108	0.2399	-0.2045	0.1153
799	292.8652	4677.602	-10.3794	0.9937	0.991	-1.0161	0.2922	-0.0852	0.0744
800	293.8879	4677.583	-10.3984	0.8006	0.722	-0.7114	0.3096	-0.5304	0.4071
801	294.9106	4677.564	-10.4174	1.1143	1.1674	-0.8637	-0.6133	-0.5264	-0.1697
802	295.9333	4677.545	-10.4364	0.9833	0.9761	-0.782	-0.6829	-0.2758	0.3985
803	296.956	4677.526	-10.4554	1.2108	1.3131	-0.9678	-0.6133	-0.2578	0.3089
804	297.9787	4677.507	-10.4744	1.2143	1.3183	-0.9826	-0.6307	-0.8182	0.6185
805	299.0014	4677.488	-10.4934	1.6417	2.0133	-1.3876	-0.8919	-0.8491	0.2105
806	300.0241	4677.469	-10.5124	0.3353	0.1408	-0.3547	-0.8919	-1.2602	-0.6281
807	301.0468	4677.45	-10.5314	1.5418	1.8436	-1.2984	-0.8919	-0.9708	0.3064
808	302.0695	4677.431	-10.5504	-0.5472	-0.7006	0.7785	-0.8744	-0.9625	0.2634
809	303.0922	4677.412	-10.5695	0.3629	0.1726	-0.221	0.1529	-0.2846	-0.0353
810	304.1148	4677.393	-10.5885	-1.0952	-1.0514	1.2615	-0.474	0.0484	-0.3011
811	305.1375	4677.374	-10.6075	-0.6575	-0.7818	0.9048	-0.8919	0.4592	0.0704
812	306.1602	4677.355	-10.6265	-0.5334	-0.6901	0.7116	-0.6133	0.2073	-0.0107
813	307.1828	4677.336	-10.6455	-1.0711	-1.0387	1.2429	-0.5262	0.119	0.3679
814	308.2055	4677.317	-10.6645	-0.9263	-0.9573	1.2318	-0.7526	0.3584	0.1714
815	309.2282	4677.298	-10.6835	0.9041	0.8641	-1.1758	0.327	0.2767	-0.3778
816	310.2508	4677.279	-10.7025	0.2698	0.0666	-0.0426	-0.6133	-0.4528	0.3096
817	259.1329	4679.252	-8.72934	1.1143	1.1674	-1.2761	1.4588	-0.8624	-0.4012
818	260.1558	4679.233	-8.74835	-0.006	-0.2251	-0.2878	1.9289	-0.5569	0.6138
819	261.1786	4679.214	-8.76737	0.549	0.396	-0.3213	-0.4914	-0.2672	0.7877
820	262.2014	4679.195	-8.78638	1.7072	2.1269	-1.4359	-0.8919	-0.3013	-0.0976
821	263.2242	4679.176	-8.80539	0.2319	0.0246	-0.2878	0.7101	-0.2925	-0.5891
822	264.247	4679.157	-8.82441	-0.1921	-0.4031	0.4627	-0.5436	-0.3925	-0.1756
823	265.2698	4679.138	-8.84342	0.418	0.2372	-0.273	-0.0387	-0.4804	-0.4239
824	266.2926	4679.119	-8.86243	-0.0267	-0.2456	0.2212	-0.77	-0.3221	-0.0841
825	267.3154	4679.1	-8.88145	1.104	1.152	-1.4248	0.2922	0.2364	0.6226

826	268.3382	4679.081	-8.90046	-0.592	-0.7342	0.8045	-0.4043	0.585	0.5931
827	269.361	4679.062	-8.91947	-0.0301	-0.249	-0.4959	2.1553	0.4225	0.0161
828	270.3838	4679.043	-8.93848	1.2763	1.4143	-1.3504	-0.3695	-0.0768	-0.3088
829	271.4066	4679.024	-8.95749	1.073	1.1062	-0.9975	0.1877	-0.4365	0.4906
830	272.4293	4679.005	-8.97651	0.1698	-0.043	-0.5628	2.2249	-0.2606	-0.6854
831	273.4521	4678.986	-8.99552	-0.623	-0.757	0.7116	0.4141	-0.0962	0.4844
832	274.4749	4678.967	-9.01453	0.5869	0.4433	-0.5962	0.5882	-0.3763	-0.3703
833	275.4977	4678.948	-9.03354	0.7558	0.6619	-0.73	0.2748	-0.799	-0.3671
834	276.5204	4678.929	-9.05255	1.6245	1.9838	-1.4173	-0.5958	-0.4859	-0.484
835	277.5432	4678.91	-9.07156	1.559	1.8726	-1.4359	-0.6133	-0.3862	-0.087
836	278.566	4678.891	-9.09057	0.9006	0.8593	-0.8154	0.1181	-0.6755	0.3081
837	279.5887	4678.872	-9.10958	0.6007	0.4607	-0.5442	0.327	-0.9012	0.4486
838	280.6115	4678.853	-9.12859	1.1109	1.1622	-1.4359	1.9812	-0.5826	-0.2602
839	281.6342	4678.834	-9.1476	1.5487	1.8552	-1.3579	-0.3869	-0.311	-0.4931
840	282.657	4678.815	-9.16661	1.3832	1.5834	-1.2799	-0.0735	-0.3392	-0.5482
841	283.6797	4678.795	-9.18562	0.9282	0.8979	-0.7225	-0.6133	-0.4569	-0.2101
842	284.7024	4678.776	-9.20463	0.1043	-0.1124	-0.0984	-0.4217	-0.6795	-0.6262
843	285.7252	4678.757	-9.22364	1.6383	2.0074	-1.4359	-0.77	-0.5096	0.4534
844	286.7479	4678.738	-9.24265	1.4659	1.7178	-1.3987	-0.4043	-0.3327	-0.2827
845	287.7706	4678.719	-9.26166	0.3939	0.2088	-0.6259	0.5534	-0.5236	-0.4688
846	288.7934	4678.7	-9.28067	1.1971	1.292	-1.1015	-0.0909	-0.8506	-0.3514
847	289.8161	4678.681	-9.29968	1.0454	1.0658	-1.0458	0.2574	-1.1651	-0.4066
848	290.8388	4678.662	-9.31869	1.2281	1.3395	-1.2724	0.8668	-0.9856	-0.7053
849	291.8615	4678.643	-9.3377	0.3146	0.1172	-0.3176	0.7101	-0.5184	-0.3088
850	292.8842	4678.624	-9.35671	0.5145	0.3534	-0.4402	0.0484	-0.5087	0.3263
851	293.9069	4678.605	-9.37571	1.6176	1.972	-1.3579	-0.8396	-0.7122	0.2921
852	294.9296	4678.586	-9.39472	1.7417	2.1874	-1.4359	-0.8919	-0.6785	-0.3491
853	295.9523	4678.567	-9.41373	1.6279	1.9897	-1.4359	-0.8396	-0.6163	0.4434
854	296.975	4678.548	-9.43274	1.6934	2.1028	-1.4359	-0.8919	-0.3794	-0.5546
855	297.9977	4678.529	-9.45174	1.397	1.6056	-1.1833	-0.8919	-0.7451	-0.1262
856	299.0204	4678.51	-9.47075	0.2181	0.0094	-0.2804	-0.265	-1.3723	-0.5627

857	300.0431	4678.491	-9.48976	1.4108	1.6279	-1.2204	-0.6133	-1.6167	-0.2549
858	301.0658	4678.472	-9.50877	1.7417	2.1874	-1.4359	-0.8919	-1.1724	0.1539
859	302.0885	4678.453	-9.52777	0.3836	0.1967	-0.3213	-0.8919	-0.7858	-0.0354
860	303.1112	4678.434	-9.54678	-0.5058	-0.6688	0.8305	-0.6655	-0.135	0.2078
861	304.1338	4678.415	-9.56579	0.1905	-0.0206	-0.0872	-0.7177	0.2286	0.5464
862	305.1565	4678.396	-9.58479	-1.1021	-1.055	1.3804	-0.8048	0.6085	0.5585
863	306.1792	4678.377	-9.6038	-1.4193	-1.1968	1.7482	-0.5784	0.346	0.2608
864	307.2019	4678.358	-9.62281	-1.0918	-1.0496	1.4361	-0.77	0.2705	0.5679
865	308.2245	4678.339	-9.64181	1.2108	1.3131	-1.2018	-0.7874	0.3048	-0.5333
866	309.2472	4678.32	-9.66082	0.2078	-0.0019	-0.1318	-0.1779	0.1709	0.224
867	310.2698	4678.301	-9.67982	-1.4296	-1.2007	1.6776	-0.7003	-0.5885	0.7207
868	259.152	4680.275	-7.70652	1.3039	1.4574	-1.213	0.1877	-0.8605	0.5668
869	260.1748	4680.256	-7.72554	-0.3128	-0.5104	0.2175	0.8668	-0.3547	-0.284
870	261.1976	4680.237	-7.74455	0.5249	0.3661	-0.3733	-0.2824	-0.3272	0.0113
871	262.2204	4680.218	-7.76357	0.6766	0.5577	-0.3696	-0.6655	-0.4874	0.2238
872	263.2432	4680.199	-7.78259	0.5042	0.3408	-0.4885	0.832	-0.1814	0.6093
873	264.266	4680.18	-7.8016	-0.1128	-0.3291	0.1729	0.5185	-0.2999	-0.5352
874	265.2888	4680.16	-7.82062	0.7248	0.6208	-0.481	-0.5436	-0.1764	0.0879
875	266.3116	4680.141	-7.83964	0.8903	0.8449	-0.7411	-0.1431	0.1397	0.2089
876	267.3344	4680.122	-7.85865	1.4177	1.639	-1.4359	-0.1605	0.4156	0.2498
877	268.3572	4680.103	-7.87767	-0.6988	-0.8109	1.0497	-0.7003	1.2422	0.2862
878	269.38	4680.084	-7.89668	-1.3262	-1.1597	1.5662	-0.4043	1.2315	-0.0541
879	270.4028	4680.065	-7.9157	0.3353	0.1408	-0.2916	0.1529	0.6485	-0.0645
880	271.4256	4680.046	-7.93471	1.0488	1.0708	-1.2316	0.6927	-0.05	0.0333
881	272.4484	4680.027	-7.95373	-0.2231	-0.4313	0.1209	0.6927	0.3062	-0.4862
882	273.4711	4680.008	-7.97274	0.8351	0.7688	-1.0978	1.7374	0.2189	0.6086
883	274.4939	4679.989	-7.99176	1.2384	1.3554	-1.1275	0.1181	-0.0504	0.2273
884	275.5167	4679.97	-8.01077	0.9971	0.9959	-0.8972	0.3444	-0.1678	0.6646
885	276.5394	4679.951	-8.02979	0.9144	0.8785	-0.756	-0.1954	-0.0403	0.2493
886	277.5622	4679.932	-8.0488	-0.1611	-0.3745	0.028	0.7797	-0.0259	-0.449
887	278.585	4679.913	-8.06782	1.1074	1.1571	-1.0681	-0.1954	-0.1366	-0.0095

888	279.6077	4679.894	-8.08683	1.1557	1.2293	-1.0421	0.031	-0.4878	0.5335
889	280.6305	4679.875	-8.10584	1.5693	1.89	-1.4359	-0.3172	-0.398	0.0863
890	281.6532	4679.856	-8.12486	1.0213	1.0307	-0.9863	0.0832	0.0671	0.6184
891	282.676	4679.837	-8.14387	1.2246	1.3342	-1.2873	0.2748	0.0559	0.1791
892	283.6987	4679.818	-8.16288	0.9213	0.8882	-0.8191	0.2922	-0.1426	0.2402
893	284.7214	4679.799	-8.1819	-1.2676	-1.1345	1.3692	-0.8919	-0.539	-0.6187
894	285.7442	4679.78	-8.20091	0.9592	0.9417	-0.8897	0.2574	-0.2077	0.4523
895	286.7669	4679.761	-8.21992	0.2043	-0.0057	-0.6074	1.1106	-0.2689	-0.5756
896	287.7896	4679.742	-8.23893	1.6452	2.0193	-1.343	-0.8919	-0.5259	0.4322
897	288.8124	4679.723	-8.25795	1.1936	1.2867	-1.1907	0.2922	-1.1348	-0.1743
898	289.8351	4679.704	-8.27696	1.4452	1.6839	-1.3802	-0.0909	-1.2098	0.1672
899	290.8578	4679.685	-8.29597	0.8972	0.8545	-0.912	0.4315	-0.8322	0.7132
900	291.8805	4679.666	-8.31498	1.1005	1.1469	-1.0123	-0.1431	-0.2977	0.4296
901	292.9032	4679.647	-8.334	1.7107	2.1329	-1.4285	-0.8919	-0.1933	0.2979
902	293.9259	4679.628	-8.35301	1.6762	2.0729	-1.4359	-0.8919	-0.3777	-0.2872
903	294.9487	4679.609	-8.37202	1.6417	2.0133	-1.4359	-0.7874	-0.5286	0.0981
904	295.9714	4679.59	-8.39103	1.6073	1.9543	-1.4359	-0.3172	-0.1941	0.7474
905	296.9941	4679.571	-8.41004	1.621	1.9779	-1.4359	-0.3869	-0.0874	0.4399
906	298.0168	4679.552	-8.42905	0.3801	0.1927	-0.5033	-0.8048	-0.4324	-0.6716
907	299.0394	4679.533	-8.44806	0.7834	0.6988	-0.6334	-0.1779	-0.5853	0.696
908	300.0621	4679.514	-8.46707	1.4452	1.6839	-1.1758	-0.6829	-0.9543	-0.5371
909	301.0848	4679.495	-8.48608	1.3212	1.4846	-1.0606	-0.7351	-1.1395	0.4759
910	302.1075	4679.476	-8.50509	0.0974	-0.1196	-0.3473	-0.4043	-0.5888	0.2249
911	303.1302	4679.457	-8.5241	-0.1025	-0.3193	0.3364	-0.6829	-0.175	0.1863
912	304.1529	4679.438	-8.54311	-0.2714	-0.4743	0.4664	-0.8919	0.3123	-0.631
913	305.1755	4679.419	-8.56212	-0.3886	-0.5746	0.563	-0.8744	0.4103	0.2829
914	306.1982	4679.4	-8.58113	-0.5437	-0.698	0.7822	-0.7874	0.0683	0.0781
915	307.2209	4679.381	-8.60014	0.7352	0.6345	-0.6334	-0.5436	-0.2973	0.0362
916	308.2435	4679.362	-8.61915	1.5762	1.9017	-1.4099	-0.8919	-0.1312	-0.4516
917	309.2662	4679.343	-8.63816	0.2698	0.0666	-0.0315	-0.7177	0.0318	0.2142
918	310.2888	4679.324	-8.65717	-0.7161	-0.8228	1.0014	-0.8919	-0.7774	0.0437

919	259.171	4681.297	-6.6837	0.6145	0.4781	-0.429	-0.5436	-1.0589	-0.4359
920	260.1938	4681.278	-6.70272	0.7041	0.5937	-0.5999	-0.4391	-0.6353	0.2614
921	261.2166	4681.259	-6.72174	1.2591	1.3874	-0.9789	-0.8919	-0.3285	0.122
922	262.2394	4681.24	-6.74076	1.3625	1.5503	-1.161	-0.3521	-0.3655	0.1946
923	263.2622	4681.221	-6.75978	1.3005	1.452	-1.2055	0.0658	-0.4502	0.4177
924	264.285	4681.202	-6.7788	1.5245	1.8148	-1.421	-0.1954	-0.237	0.3578
925	265.3078	4681.183	-6.79782	1.5349	1.8321	-1.4173	-0.3869	-0.0496	-0.731
926	266.3306	4681.164	-6.81684	0.8455	0.783	-0.5814	-0.6655	0.7109	0.4897
927	267.3534	4681.145	-6.83586	1.0523	1.0758	-1.0161	-0.3521	1.0314	-0.0402
928	268.3762	4681.126	-6.85488	1.3625	1.5503	-1.2613	-0.1431	2.1338	-0.5714
929	269.399	4681.107	-6.8739	-0.7333	-0.8345	0.3512	0.5882	2.7193	0.1429
930	270.4218	4681.088	-6.89291	0.5628	0.4131	-0.8674	-0.2302	2.4132	0.4443
931	271.4446	4681.069	-6.91193	-0.4093	-0.5917	0.1952	0.2748	0.7073	-0.5862
932	272.4674	4681.05	-6.93095	0.1181	-0.0979	-0.1281	0.6927	0.2342	-0.2762
933	273.4901	4681.031	-6.94997	0.8524	0.7925	-0.9195	0.0136	0.5135	-0.1928
934	274.5129	4681.012	-6.96899	1.2729	1.4089	-1.3319	0.1703	-0.0251	0.3394
935	275.5357	4680.993	-6.98801	1.3866	1.5889	-1.317	-0.0909	-0.1797	-0.5464
936	276.5585	4680.974	-7.00702	1.073	1.1062	-1.0941	0.2748	-0.2249	-0.4073
937	277.5812	4680.955	-7.02604	-0.5541	-0.7059	0.6782	-0.1257	-0.0323	-0.5499
938	278.604	4680.936	-7.04506	0.5904	0.4476	-0.3547	-0.7351	0.0726	-0.3639
939	279.6267	4680.917	-7.06408	1.104	1.152	-0.9566	-0.6481	-0.2867	-0.2334
940	280.6495	4680.898	-7.08309	1.2557	1.3821	-1.1795	0.0484	-0.3803	0.3625
941	281.6722	4680.879	-7.10211	1.6142	1.9661	-1.3133	-0.8744	-0.0879	0.4606
942	282.695	4680.86	-7.12113	1.6004	1.9426	-1.4248	-0.4217	-0.1106	0.3098
943	283.7177	4680.841	-7.14014	1.1074	1.1571	-0.782	-0.857	0.1239	0.1737
944	284.7405	4680.822	-7.15916	-0.2335	-0.4406	0.2212	-0.2998	0.0463	-0.5748
945	285.7632	4680.803	-7.17818	1.3798	1.5779	-1.135	-0.5958	0.2996	0.7419
946	286.7859	4680.784	-7.19719	0.2767	0.0744	-0.2655	-0.6481	-0.2169	-0.6473
947	287.8087	4680.765	-7.21621	1.5935	1.9309	-1.4359	-0.2302	-0.685	0.4878
948	288.8314	4680.746	-7.23522	1.5349	1.8321	-1.2836	-0.5958	-1.2727	0.7969
949	289.8541	4680.727	-7.25424	1.5935	1.9309	-1.3839	-0.4043	-1.039	0.3227

950	290.8768	4680.708	-7.27325	0.9213	0.8882	-0.756	-0.8919	-0.7379	-0.3235
951	291.8995	4680.689	-7.29227	0.0906	-0.1268	-0.1875	-0.3521	-0.6432	-0.5843
952	292.9223	4680.67	-7.31128	0.3732	0.1846	-0.3584	-0.5784	-0.3969	-0.5181
953	293.945	4680.651	-7.3303	1.073	1.1062	-1.2427	0.2399	-0.1234	-0.4571
954	294.9677	4680.632	-7.34931	1.2143	1.3183	-1.2278	-0.3172	-0.2364	-0.2886
955	295.9904	4680.613	-7.36833	0.6076	0.4694	-0.6185	-0.5436	-0.2816	-0.4333
956	297.0131	4680.594	-7.38734	-0.0784	-0.2961	0.2658	-0.8222	-0.248	-0.7129
957	298.0358	4680.575	-7.40636	0.9351	0.9076	-0.9492	-0.6655	-0.1078	-0.3583
958	299.0585	4680.556	-7.42537	0.1112	-0.1052	0.0837	-0.2476	-0.1136	-0.0163
959	300.0811	4680.537	-7.44439	-0.4196	-0.6001	0.7079	-0.8919	-0.3719	0.4488
960	301.1038	4680.518	-7.4634	1.1212	1.1776	-1.0606	-0.8919	-0.2967	0.5794
961	302.1265	4680.499	-7.48241	0.032	-0.1869	0.3326	-0.8919	-0.2243	0.4739
962	303.1492	4680.48	-7.50143	0.2526	0.0474	0.0205	-0.6829	-0.0525	0.1158
963	304.1719	4680.461	-7.52044	-0.1404	-0.3552	0.4478	-0.4217	0.2321	0.4057
964	305.1945	4680.442	-7.53945	0.4559	0.2824	-0.5591	-0.6655	0.1337	-0.2576
965	306.2172	4680.423	-7.55847	0.1767	-0.0355	0.1283	-0.474	-0.4149	0.0373
966	307.2399	4680.404	-7.57748	1.3177	1.4791	-1.0569	-0.7003	-0.7362	-0.5381
967	308.2625	4680.385	-7.59649	-0.6747	-0.794	0.9234	-0.8919	-0.6031	0.0553
968	309.2852	4680.366	-7.6155	0.5628	0.4131	-0.7708	-0.1257	-0.3619	-0.6023
969	310.3078	4680.347	-7.63452	-0.2714	-0.4743	0.4738	-0.77	-0.8958	0.5042
970	259.19	4682.32	-5.66088	-1.3917	-1.1862	1.7148	-0.6829	-1.1002	-0.421
971	260.2128	4682.301	-5.6799	-1.4641	-1.2133	1.8002	-0.8396	-0.7111	-0.5335
972	261.2356	4682.282	-5.69892	-0.4575	-0.6307	0.5704	-0.3172	-0.6112	-0.4976
973	262.2585	4682.263	-5.71795	0.7627	0.6711	-0.6965	-0.6133	-0.4795	-0.2551
974	263.2813	4682.244	-5.73697	1.1419	1.2086	-0.9678	-0.8919	-0.4345	0.2779
975	264.3041	4682.225	-5.75599	1.6555	2.0371	-1.4359	-0.8919	-0.4607	0.5157
976	265.3269	4682.206	-5.77502	0.9454	0.9222	-0.8303	-0.0212	0.0695	0.4086
977	266.3497	4682.187	-5.79404	0.549	0.396	-0.8674	1.128	0.7573	-0.395
978	267.3725	4682.168	-5.81306	0.9764	0.9663	-0.8043	-0.561	1.4302	0.5711
979	268.3953	4682.149	-5.83209	-0.7161	-0.8228	0.9085	-0.265	2.4025	0.2522
980	269.418	4682.13	-5.85111	-0.7816	-0.8668	-0.7002	-0.0561	3.0954	-0.1952

981	270.4408	4682.111	-5.87013	0.2939	0.0937	-1.4359	0.832	2.7113	0.0788
982	271.4636	4682.092	-5.88915	1.1867	1.2763	-1.3802	1.3543	2.0419	0.5291
983	272.4864	4682.073	-5.90817	-0.5299	-0.6875	0.3326	-0.1083	0.7882	-0.5262
984	273.5092	4682.054	-5.9272	0.8799	0.8305	-0.7708	-0.0387	0.7656	0.1686
985	274.5319	4682.035	-5.94622	0.2112	0.0019	-0.0538	-0.5262	0.3684	0.4981
986	275.5547	4682.016	-5.96524	1.428	1.6558	-1.1758	-0.6481	0.2276	-0.1366
987	276.5775	4681.997	-5.98426	0.68	0.5622	-0.5405	0.0832	-0.1125	0.5307
988	277.6002	4681.978	-6.00328	1.3625	1.5503	-1.0644	-0.8048	0.0689	-0.0148
989	278.623	4681.959	-6.0223	0.1457	-0.0688	0.0763	-0.7874	-0.1352	-0.2254
990	279.6458	4681.94	-6.04132	-0.7988	-0.878	1.0646	-0.4565	0.1612	-0.5366
991	280.6685	4681.921	-6.06034	0.2146	0.0056	-0.0352	-0.4565	0.2482	-0.5177
992	281.6913	4681.902	-6.07936	1.0661	1.096	-1.0606	0.031	-0.0407	-0.3748
993	282.714	4681.883	-6.09838	1.2763	1.4143	-1.1795	-0.4391	-0.195	-0.3179
994	283.7367	4681.864	-6.1174	0.7007	0.5892	-0.5256	-0.561	1.064	-0.3633
995	284.7595	4681.845	-6.13642	-0.4265	-0.6057	-0.5553	0.5185	2.3581	-0.5309
996	285.7822	4681.826	-6.15544	1.4866	1.7519	-1.2799	-0.6655	2.9739	0.4824
997	286.8049	4681.807	-6.17446	-1.0091	-1.005	1.1575	-0.8744	1.0403	-0.5414
998	287.8277	4681.788	-6.19348	0.5697	0.4217	-0.678	-0.77	-0.1097	-0.3125
999	288.8504	4681.769	-6.2125	0.4697	0.299	-0.3324	-0.5436	-0.9238	-0.2573
1000	289.8731	4681.75	-6.23152	0.5594	0.4088	-0.6185	-0.7177	-0.9683	-0.5968
1001	290.8958	4681.731	-6.25054	1.1454	1.2137	-1.1981	-0.3521	-0.7931	0.1501
1002	291.9186	4681.712	-6.26956	1.4901	1.7576	-1.2984	-0.4217	-0.8681	0.0087
1003	292.9413	4681.693	-6.28857	1.6831	2.0849	-1.4359	-0.6655	-0.8083	-0.0306
1004	293.964	4681.674	-6.30759	1.459	1.7065	-1.4359	-0.1083	-0.5867	0.079
1005	294.9867	4681.655	-6.32661	1.7003	2.1149	-1.4359	-0.77	-0.3114	-0.1781
1006	296.0094	4681.635	-6.34563	1.6728	2.0669	-1.3802	-0.8919	-0.2032	0.1775
1007	297.0321	4681.616	-6.36465	1.073	1.1062	-0.782	-0.8919	-0.304	-0.0108
1008	298.0548	4681.597	-6.38366	1.659	2.043	-1.3653	-0.8919	-0.0667	0.7312
1009	299.0775	4681.578	-6.40268	0.1767	-0.0355	0.1283	-0.5088	-0.0498	0.2795
1010	300.1002	4681.559	-6.4217	-0.7126	-0.8204	0.9197	-0.8919	-0.0419	0.0552
1011	301.1228	4681.54	-6.44072	1.204	1.3025	-0.9046	-0.8919	-0.068	-0.3148

1012	302.1455	4681.521	-6.45973	0.618	0.4825	-0.3733	-0.8919	-0.3258	0.1268
1013	303.1682	4681.502	-6.47875	0.0147	-0.2044	0.2806	-0.6307	-0.364	0.0794
1014	304.1909	4681.483	-6.49777	0.5904	0.4476	-0.8191	0.3096	-0.0877	-0.5528
1015	305.2136	4681.464	-6.51678	0.8213	0.7501	-0.9863	-0.0735	-0.2153	-0.3492
1016	306.2362	4681.445	-6.5358	0.973	0.9614	-0.6668	-0.6481	-0.5842	-0.3769
1017	307.2589	4681.426	-6.55482	-0.4437	-0.6197	0.7562	-0.3869	-0.834	0.12
1018	308.2815	4681.407	-6.57383	-1.4227	-1.1981	1.7482	-0.8919	-0.4877	0.4875
1019	309.3042	4681.388	-6.59285	0.5525	0.4002	-0.6036	-0.7003	-0.2252	-0.3168
1020	310.3269	4681.369	-6.61186	1.4211	1.6446	-1.395	-0.6829	-0.9333	0.1856
1021	259.209	4683.343	-4.63806	0.0216	-0.1974	0.3624	-0.8396	-1.2074	0.6446
1022	260.2318	4683.324	-4.65708	1.6107	1.9602	-1.3727	-0.8919	-0.677	0.0259
1023	261.2547	4683.305	-4.67611	-0.1473	-0.3616	0.4887	-0.5436	-0.4198	-0.0359
1024	262.2775	4683.286	-4.69514	1.0592	1.0859	-0.8117	-0.4565	-0.1174	-0.5453
1025	263.3003	4683.267	-4.71416	1.1247	1.1828	-0.8303	-0.7177	-0.1464	-0.1682
1026	264.3231	4683.248	-4.73319	1.6762	2.0729	-1.4359	-0.561	-0.3981	0.2056
1027	265.3459	4683.229	-4.75222	-0.7643	-0.8554	1.098	-0.5958	-0.3467	0.8327
1028	266.3687	4683.21	-4.77124	0.5559	0.4045	-0.2655	-0.474	0.3799	-0.4547
1029	267.3915	4683.191	-4.79027	0.0216	-0.1974	0.1394	-0.474	0.7604	0.3541
1030	268.4143	4683.172	-4.80929	-0.4437	-0.6197	0.485	-0.0038	1.2467	-0.0611
1031	269.4371	4683.153	-4.82832	-0.4231	-0.6029	0.5593	-0.8919	2.3815	-0.241
1032	270.4599	4683.134	-4.84735	-0.6575	-0.7818	0.0651	1.215	2.0965	-0.6063
1033	271.4826	4683.115	-4.86637	0.8144	0.7407	-1.3319	0.2574	1.6139	-0.2773
1034	272.5054	4683.096	-4.8854	-0.7678	-0.8576	-1.1238	-0.8396	0.8516	-0.6805
1035	273.5282	4683.077	-4.90442	0.256	0.0513	-0.7597	1.3021	0.9331	0.0095
1036	274.551	4683.058	-4.92345	-0.7919	-0.8735	0.916	-0.5784	0.2674	0.5873
1037	275.5737	4683.039	-4.94247	-0.2266	-0.4344	0.132	0.536	0.0525	0.6882
1038	276.5965	4683.02	-4.9615	0.9385	0.9125	-0.8749	-0.1257	-0.3611	-0.264
1039	277.6193	4683.001	-4.98052	1.1626	1.2397	-1.0532	-0.1779	-0.5499	0.1147
1040	278.642	4682.982	-4.99954	1.2832	1.425	-1.3542	0.6927	-0.1406	0.5561
1041	279.6648	4682.963	-5.01857	0.8592	0.8019	-0.5739	-0.8919	0.4289	-0.1909
1042	280.6875	4682.944	-5.03759	-0.9194	-0.9532	1.1649	-0.5784	0.4613	0.0266

1043	281.7103	4682.924	-5.05662	-0.3197	-0.5164	0.2918	0.0832	0.4505	-0.3011	
1044	282.733	4682.905	-5.07564	1.1695	1.2501	-1.1758	0.4315	0.3234	0.6387	
1045	283.7558	4682.886	-5.09466	1.5797	1.9075	-1.317	-0.6481	2.4317	0.4794	
1046	284.7785	4682.867	-5.11369	-1.2055	-1.1061	-1.2687	0.0484	3.5927	-0.4337	
1047	285.8012	4682.848	-5.13271	-1.1814	-1.0946	0.0131	-0.8222	3.9934	-0.4793	
1048	286.824	4682.829	-5.15173	0.2181	0.0094	-0.3436	-0.3695	1.8289	-0.2619	
1049	287.8467	4682.81	-5.17075	0.9558	0.9369	-1.0978	-0.0212	-0.0072	-0.1072	
1050	288.8694	4682.791	-5.18978	0.2491	0.0436	-0.0835	-0.474	-0.5173	-0.2513	
1051	289.8921	4682.772	-5.2088	0.7593	0.6665	-0.5182	-0.857	-0.7199	-0.1967	
1052	290.9149	4682.753	-5.22782	1.5693	1.89	-1.3839	-0.5436	-0.9405	-0.3109	
1053	291.9376	4682.734	-5.24684	1.2626	1.3928	-1.0755	-0.2476	-1.0802	0.3517	
1054	292.9603	4682.715	-5.26586	1.1522	1.2241	-1.2799	1.1628	-1.1839	0.4716	
1055	293.983	4682.696	-5.28489	1.6176	1.972	-1.4322	-0.3521	-1.0814	0.2702	
1056	295.0057	4682.677	-5.30391	1.1178	1.1725	-0.8712	-0.77	-0.7847	0.4692	
1057	296.0284	4682.658	-5.32293	0.7455	0.6482	-0.6259	-0.4217	-0.4427	0.4714	
1058	297.0511	4682.639	-5.34195	-0.8229	-0.8936	1.02	-0.7003	-0.4787	0.4133	
1059	298.0738	4682.62	-5.36097	0.6731	0.5533	-0.403	-0.7874	-0.5636	-0.5234	
1060	299.0965	4682.601	-5.37999	-0.3438	-0.537	0.4924	-0.561	-0.4445	0.3384	
1061	300.1192	4682.582	-5.39901	-0.4575	-0.6307	0.7376	-0.6307	-0.1496	-0.1735	
1062	301.1419	4682.563	-5.41803	1.2729	1.4089	-1.161	-0.0909	-0.1146	-0.1995	
1063	302.1645	4682.544	-5.43705	0.2905	0.0899	-0.1095	-0.1779	-0.1148	0.4517	
1064	303.1872	4682.525	-5.45607	1.6073	1.9543	-1.3542	-0.7526	-0.2855	-0.1216	
1065	304.2099	4682.506	-5.47509	0.0354	-0.1834	0.2323	-0.474	0.1643	0.1628	
1066	305.2326	4682.487	-5.49411	-1.0642	-1.035	1.202	-0.4391	-0.0073	-0.0455	
1067	306.2552	4682.468	-5.51313	0.1767	-0.0355	-0.0055	-0.1605	-0.4091	-0.1096	
1068	307.2779	4682.449	-5.53215	-1.9087	-1.3292	2.3018	-0.8222	-0.5579	0.776	
1069	308.3006	4682.43	-5.55117	-1.4227	-1.1981	1.6033	-0.8919	-0.4928	0.3344	
1070	309.3232	4682.411	-5.57019	-1.2641	-1.1329	1.6405	-0.8919	-0.2729	0.505	
1071	310.3459	4682.392	-5.58921	0.4077	0.225	-0.9157	-0.4391	-0.9007	-0.6367	
1072	259.2281	4684.366	-3.61523	0.9696	0.9565	-0.6705	-0.7003	-1.4246	-0.3897	
1073	260.2509	4684.347	-3.63427	1.6728	2.0669	-1.4359	-0.7177	-0.8331	0.1867	

1074	261.2737	4684.328	-3.6533	1.366	1.5558	-1.3467	0.5011	-0.4597	0.5482
1075	262.2965	4684.309	-3.67233	1.0144	1.0208	-0.7634	-0.5784	-0.0706	0.052
1076	263.3193	4684.29	-3.69136	1.0695	1.1011	-0.8972	-0.3869	-0.3482	-0.5104
1077	264.3421	4684.271	-3.71039	1.6486	2.0252	-1.4359	-0.5958	-0.6977	-0.033
1078	265.3649	4684.252	-3.72942	1.3694	1.5613	-1.0718	-0.8919	-0.8505	0.0967
1079	266.3877	4684.233	-3.74845	1.1247	1.1828	-0.938	-0.1954	-0.2773	-0.3208
1080	267.4105	4684.214	-3.76748	0.7145	0.6072	-0.4625	-0.3521	0.0047	0.2261
1081	268.4333	4684.195	-3.7865	0.5938	0.452	-0.273	-0.6133	0.2144	0.4483
1082	269.4561	4684.176	-3.80553	-0.2955	-0.4955	0.6745	-0.5088	0.3463	0.5702
1083	270.4789	4684.157	-3.82456	0.3353	0.1408	-0.2953	0.623	0.6173	0.5164
1084	271.5017	4684.138	-3.84359	-1.3917	-1.1862	1.4175	-0.5262	0.7728	0.3838
1085	272.5244	4684.118	-3.86262	-0.8815	-0.9303	0.1023	0.1181	1.1441	-0.1958
1086	273.5472	4684.099	-3.88165	1.166	1.2449	-1.3133	0.0136	1.1541	-0.173
1087	274.57	4684.08	-3.90068	0.3836	0.1967	-0.2878	-0.2302	0.3797	0.3241
1088	275.5928	4684.061	-3.9197	1.1695	1.2501	-1.0012	-0.2476	0.0341	-0.581
1089	276.6155	4684.042	-3.93873	1.3108	1.4683	-1.4359	1.1454	-0.2451	0.4026
1090	277.6383	4684.023	-3.95776	1.3315	1.5009	-1.2799	-0.0561	-0.6244	0.6672
1091	278.661	4684.004	-3.97679	1.69	2.0968	-1.4359	-0.8919	-0.182	-0.2115
1092	279.6838	4683.985	-3.99581	1.6004	1.9426	-1.4248	-0.7177	-0.0683	0.2608
1093	280.7066	4683.966	-4.01484	0.9041	0.8641	-0.6334	-0.7177	0.7342	0.2071
1094	281.7293	4683.947	-4.03387	-0.4403	-0.6169	0.6373	-0.8222	0.8271	-0.2301
1095	282.752	4683.928	-4.0529	-1.3262	-1.1597	1.6888	-0.8919	0.8942	0.0991
1096	283.7748	4683.909	-4.07192	0.7869	0.7034	-0.912	-0.3869	2.3818	-0.0147
1097	284.7975	4683.89	-4.09095	-1.5192	-1.2324	0.9643	-0.0038	3.5571	-0.5121
1098	285.8203	4683.871	-4.10998	0.6214	0.4869	-0.8712	-0.2476	3.1175	-0.145
1099	286.843	4683.852	-4.129	1.2694	1.4035	-1.0495	-0.4217	1.1223	0.651
1100	287.8657	4683.833	-4.14803	1.1074	1.1571	-0.9343	-0.8919	-0.3995	-0.3307
1101	288.8884	4683.814	-4.16705	1.621	1.9779	-1.4359	-0.5262	-0.5905	-0.1038
1102	289.9112	4683.795	-4.18608	1.721	2.1511	-1.4359	-0.8919	-0.5579	0.1882
1103	290.9339	4683.776	-4.2051	1.3625	1.5503	-1.1647	-0.2476	-0.6774	0.2036
1104	291.9566	4683.757	-4.22413	0.9592	0.9417	-0.886	-0.1779	-1.0141	-0.3352

1105	292.9793	4683.738	-4.24315	0.973	0.9614	-0.8786	-0.4043	-1.0192	-0.0666
1106	294.002	4683.719	-4.26218	1.3832	1.5834	-1.265	-0.0038	-0.8349	0.4486
1107	295.0247	4683.7	-4.2812	1.3074	1.4629	-1.1721	-0.3347	-0.4806	0.2103
1108	296.0474	4683.681	-4.30023	0.3043	0.1054	-0.0092	-0.8048	-0.2314	-0.0246
1109	297.0701	4683.662	-4.31925	-0.4886	-0.6553	0.7785	-0.8919	-0.2365	0.1709
1110	298.0928	4683.643	-4.33828	-0.9746	-0.9855	1.3432	-0.77	-0.4066	-0.1604
1111	299.1155	4683.624	-4.3573	-0.6023	-0.7419	0.9383	-0.7177	-0.5472	-0.1296
1112	300.1382	4683.605	-4.37633	0.4697	0.299	-0.2247	-0.6133	-0.271	0.6165
1113	301.1609	4683.586	-4.39535	-0.0956	-0.3127	0.2955	-0.77	-0.0636	-0.3226
1114	302.1836	4683.567	-4.41437	0.2457	0.0398	-0.2544	0.0832	0.1937	-0.4285
1115	303.2062	4683.548	-4.4334	-0.6644	-0.7867	0.6967	-0.4043	0.1146	-0.4454
1116	304.2289	4683.529	-4.45242	-1.3021	-1.1495	1.6776	-0.8396	0.1313	0.5359
1117	305.2516	4683.51	-4.47144	-1.2055	-1.1061	1.425	-0.5958	0.0144	0.7077
1118	306.2743	4683.491	-4.49047	-0.1921	-0.4031	-0.0055	-0.0038	-0.0871	-0.0955
1119	307.2969	4683.472	-4.50949	0.1285	-0.087	-0.2433	-0.1954	-0.2652	-0.1997
1120	308.3196	4683.453	-4.52851	-0.2473	-0.453	0.4441	-0.8919	-0.1656	-0.5501
1121	309.3422	4683.434	-4.54754	1.1798	1.2658	-0.99	-0.7874	-0.2952	-0.3792
1122	310.3649	4683.415	-4.56656	0.1319	-0.0834	-0.2693	-0.474	-0.9904	-0.0565
1123	259.2471	4685.389	-2.59241	1.4797	1.7405	-1.4099	0.2225	-1.1277	0.4602
1124	260.2699	4685.37	-2.61145	1.7279	2.1632	-1.4359	-0.857	-0.6007	0.0847
1125	261.2927	4685.351	-2.63048	1.3556	1.5393	-1.4359	0.6056	-0.5203	-0.0811
1126	262.3155	4685.332	-2.64952	1.5521	1.861	-1.3244	-0.5436	-0.2444	0.7522
1127	263.3383	4685.313	-2.66855	1.7382	2.1814	-1.4359	-0.8919	-0.4985	0.4613
1128	264.3612	4685.294	-2.68758	1.7245	2.1571	-1.4359	-0.8919	-0.9414	0.5234
1129	265.384	4685.274	-2.70662	1.5521	1.861	-1.4359	-0.0387	-1.1272	0.011
1130	266.4068	4685.255	-2.72565	0.8386	0.7736	-0.7151	-0.0387	-0.9404	-0.5265
1131	267.4295	4685.236	-2.74468	0.5214	0.3619	-0.3919	0.0658	-0.8098	-0.5948
1132	268.4523	4685.217	-2.76371	0.942	0.9173	-0.8043	-0.4043	-0.4018	-0.0523
1133	269.4751	4685.198	-2.78275	1.7417	2.1874	-1.4359	-0.8919	-0.2266	-0.1136
1134	270.4979	4685.179	-2.80178	1.5762	1.9017	-1.4359	-0.1605	0.0482	0.2581
1135	271.5207	4685.16	-2.82081	0.58	0.4347	-0.9306	1.9986	0.2113	0.5277

1136	272.5435	4685.141	-2.83984	-1.3469	-1.1683	1.5104	-0.3521	0.8505	-0.2828
1137	273.5662	4685.122	-2.85887	0.6524	0.5266	-0.9269	0.0484	0.7428	-0.51
1138	274.589	4685.103	-2.87791	1.0764	1.1112	-0.9789	-0.1605	0.3307	0.6081
1139	275.6118	4685.084	-2.89694	0.4284	0.2495	-0.2916	-0.1083	-0.3543	-0.3153
1140	276.6346	4685.065	-2.91597	1.0144	1.0208	-0.8154	-0.2128	-0.4107	0.0172
1141	277.6573	4685.046	-2.935	1.2901	1.4358	-1.1833	-0.4043	-0.5697	0.5173
1142	278.6801	4685.027	-2.95403	1.2557	1.3821	-1.1312	-0.5262	-0.1027	0.0706
1143	279.7028	4685.008	-2.97306	-0.2369	-0.4437	0.5296	-0.8919	-0.2308	0.2105
1144	280.7256	4684.989	-2.99209	-0.0129	-0.2319	0.3847	-0.8919	0.6368	-0.1121
1145	281.7483	4684.97	-3.01112	-0.0853	-0.3028	0.2992	-0.8919	1.0519	0.3812
1146	282.7711	4684.951	-3.03015	-0.2679	-0.4713	0.1432	-0.8919	1.4432	0.0798
1147	283.7938	4684.932	-3.04918	-1.4606	-1.2121	0.7711	0.2748	1.3096	-0.6101
1148	284.8166	4684.913	-3.06821	-0.3886	-0.5746	0.4478	-0.1779	1.7079	-0.3949
1149	285.8393	4684.894	-3.08724	0.618	0.4825	-0.403	-0.2998	0.6844	-0.0536
1150	286.862	4684.875	-3.10627	0.711	0.6027	-0.6185	-0.3521	-0.292	0.5284
1151	287.8847	4684.856	-3.1253	0.68	0.5622	-0.4439	-0.4565	-0.9102	0.0069
1152	288.9075	4684.837	-3.14433	1.5418	1.8436	-1.4359	-0.0909	-0.4501	0.1382
1153	289.9302	4684.818	-3.16336	1.0488	1.0708	-0.9492	-0.8919	-0.3798	-0.2645
1154	290.9529	4684.799	-3.18239	1.1109	1.1622	-1.1572	0.7275	-0.1766	-0.2016
1155	291.9756	4684.78	-3.20142	0.1423	-0.0724	0.1766	-0.3869	-0.4494	0.7791
1156	292.9983	4684.761	-3.22045	0.0561	-0.1623	0.1134	-0.4565	-0.3338	-0.6527
1157	294.021	4684.742	-3.23947	0.6559	0.531	-0.6297	0.031	-0.4202	-0.4586
1158	295.0438	4684.723	-3.2585	0.3698	0.1806	-0.2841	-0.0561	-0.3841	-0.5706
1159	296.0665	4684.704	-3.27753	-0.3541	-0.5457	0.4775	-0.4565	-0.2806	-0.7103
1160	297.0892	4684.685	-3.29656	-0.3714	-0.5602	-0.024	-0.8048	-0.1763	-0.2689
1161	298.1118	4684.666	-3.31559	-0.0301	-0.249	0.4181	-0.857	-0.1965	-0.1365
1162	299.1345	4684.647	-3.33461	0.5559	0.4045	-0.3584	-0.1605	-0.1748	0.6365
1163	300.1572	4684.627	-3.35364	-0.1197	-0.3357	0.2249	-0.2476	0.1798	-0.3002
1164	301.1799	4684.608	-3.37267	-0.1163	-0.3324	0.0837	0.1007	0.3123	0.0053
1165	302.2026	4684.589	-3.39169	-0.2369	-0.4437	0.3512	-0.4565	0.4771	-0.3569
1166	303.2253	4684.57	-3.41072	-1.2021	-1.1044	1.4473	-0.7874	0.4834	0.0637

1167	304.2479	4684.551	-3.42975	0.811	0.736	-0.86	0.327	0.4338	0.4729
1168	305.2706	4684.532	-3.44878	-0.6609	-0.7843	0.7636	-0.8919	0.1797	-0.4198
1169	306.2933	4684.513	-3.4678	-0.8333	-0.9002	1.1835	-0.8919	0.1388	0.5461
1170	307.3159	4684.494	-3.48683	-0.2438	-0.4499	0.3475	-0.3695	-0.0368	0.1639
1171	308.3386	4684.475	-3.50585	-0.9643	-0.9795	0.9643	-0.8919	-0.1137	0.3406
1172	309.3613	4684.456	-3.52488	-1.0642	-1.035	1.1537	0.327	-0.3001	0.445
1173	310.3839	4684.437	-3.54391	0.194	-0.0169	-0.3399	0.9887	-0.9253	0.0268
1174	259.2661	4686.412	-1.56959	0.256	0.0513	-0.0612	-0.1954	-0.8972	-0.4149
1175	260.2889	4686.392	-1.58863	1.0557	1.0809	-0.7931	-0.8222	-0.2933	-0.082
1176	261.3118	4686.373	-1.60767	1.621	1.9779	-1.4359	-0.6481	0.2029	0.4727
1177	262.3346	4686.354	-1.62671	1.6831	2.0849	-1.3802	-0.8919	0.425	0.294
1178	263.3574	4686.335	-1.64574	1.59	1.925	-1.4062	-0.6655	-0.0273	-0.5238
1179	264.3802	4686.316	-1.66478	1.6314	1.9956	-1.4359	-0.4565	-0.5589	0.2684
1180	265.403	4686.297	-1.68382	1.5935	1.9309	-1.3616	-0.8919	-0.9285	0.3415
1181	266.4258	4686.278	-1.70285	1.7176	2.145	-1.4359	-0.8919	-0.8967	0.3277
1182	267.4486	4686.259	-1.72189	1.2488	1.3714	-0.9269	-0.8919	-0.9329	-0.1569
1183	268.4714	4686.24	-1.74092	0.3077	0.1094	0.0614	-0.8919	-0.7034	-0.5405
1184	269.4942	4686.221	-1.75996	1.0592	1.0859	-0.9009	-0.5784	-0.3616	-0.6242
1185	270.5169	4686.202	-1.779	0.2422	0.036	-0.1244	-0.3347	-0.088	-0.582
1186	271.5397	4686.183	-1.79803	1.0213	1.0307	-0.9046	-0.2476	0.3649	-0.476
1187	272.5625	4686.164	-1.81707	-1.1918	-1.0995	1.1092	1.3717	1.1377	0.006
1188	273.5853	4686.145	-1.8361	0.3181	0.1211	-0.6854	1.5807	1.2663	-0.5459
1189	274.6081	4686.126	-1.85514	0.3767	0.1886	-0.1838	-0.4391	0.3132	0.5963
1190	275.6308	4686.107	-1.87417	-0.0611	-0.2794	0.2175	-0.3521	-0.7972	-0.2172
1191	276.6536	4686.088	-1.89321	0.7455	0.6482	-0.5293	-0.4217	-0.6729	0.0355
1192	277.6763	4686.069	-1.91224	1.4866	1.7519	-1.3356	-0.474	-0.4059	-0.1304
1193	278.6991	4686.05	-1.93127	1.2384	1.3554	-0.9789	-0.7874	-0.0853	-0.5055
1194	279.7219	4686.031	-1.95031	0.3422	0.1487	-0.1392	-0.5262	0.3777	0.6977
1195	280.7446	4686.012	-1.96934	1.2177	1.3236	-0.9009	-0.8919	1.4508	0.0042
1196	281.7674	4685.993	-1.98838	-0.685	-0.8013	0.5147	-0.3521	1.8138	-0.413
1197	282.7901	4685.974	-2.00741	-1.3848	-1.1835	0.4107	-0.8919	1.5976	-0.6413

1198	283.8128	4685.955	-2.02644	-0.2231	-0.4313	0.21	-0.6829	0.8579	-0.0554
1199	284.8356	4685.936	-2.04548	1.2315	1.3448	-0.9678	-0.6655	0.528	0.1665
1200	285.8583	4685.917	-2.06451	1.3315	1.5009	-1.1944	-0.1257	0.0569	-0.3622
1201	286.8811	4685.898	-2.08354	0.4353	0.2577	-0.3807	0.0832	-0.4639	0.0539
1202	287.9038	4685.879	-2.10257	-0.0267	-0.2456	0.2398	-0.8396	-0.6375	0.523
1203	288.9265	4685.86	-2.12161	1.2798	1.4196	-1.1981	-0.2824	-0.1648	-0.388
1204	289.9492	4685.84	-2.14064	-0.3197	-0.5164	0.2992	0.2225	0.219	-0.2989
1205	290.9719	4685.821	-2.15967	0.3594	0.1686	-0.2321	0.0658	0.1208	0.4659
1206	291.9947	4685.802	-2.1787	-1.1194	-1.0638	1.4101	-0.6481	-0.4557	0.3374
1207	293.0174	4685.783	-2.19774	-0.9436	-0.9675	1.2243	-0.7003	-0.4079	-0.4056
1208	294.0401	4685.764	-2.21677	-0.0577	-0.2761	0.2583	0.0658	-0.1864	0.2828
1209	295.0628	4685.745	-2.2358	-1.8467	-1.3182	2.1718	-0.5262	-0.2133	0.0779
1210	296.0855	4685.726	-2.25483	-0.7919	-0.8735	1.2392	-0.8222	-0.0801	0.4427
1211	297.1082	4685.707	-2.27386	0.0078	-0.2113	-0.0315	-0.5436	-0.1206	0.0089
1212	298.1309	4685.688	-2.29289	0.5559	0.4045	-0.4142	-0.8744	-0.2077	-0.5929
1213	299.1536	4685.669	-2.31192	1.5831	1.9133	-1.4359	-0.7874	-0.1313	-0.5645
1214	300.1763	4685.65	-2.33095	0.4628	0.2907	-0.3176	-0.5958	0.1085	-0.0799
1215	301.1989	4685.631	-2.34999	-0.4472	-0.6225	0.7488	-0.8396	0.2711	-0.2016
1216	302.2216	4685.612	-2.36902	-0.0404	-0.2592	0.3512	-0.3869	0.2385	0.4859
1217	303.2443	4685.593	-2.38805	0.5731	0.426	-0.2581	-0.7177	-0.1378	0.335
1218	304.267	4685.574	-2.40708	0.7214	0.6163	-0.6965	-0.2302	-0.0791	-0.6195
1219	305.2896	4685.555	-2.42611	-0.0818	-0.2994	-0.0352	1.0061	0.1426	0.4227
1220	306.3123	4685.536	-2.44514	0.5559	0.4045	-0.4996	-0.7003	0.3743	-0.1345
1221	307.335	4685.517	-2.46417	-0.8436	-0.9067	0.9345	-0.2824	0.534	0.584
1222	308.3576	4685.498	-2.48319	-0.9022	-0.9429	0.8862	-0.0387	0.1893	0.4615
1223	309.3803	4685.479	-2.50222	0.4215	0.2413	-0.1689	-0.5784	-0.3434	0.3129
1224	310.4029	4685.46	-2.52125	0.5111	0.3492	-0.4067	-0.0387	-1.1033	-0.1317
1225	259.2852	4687.434	-0.54677	0.8179	0.7454	-1.1907	-0.1431	-0.8405	-0.5404
1226	260.308	4687.415	-0.56581	1.1316	1.1931	-1.4173	-0.4043	-0.096	-0.341
1227	261.3308	4687.396	-0.58486	0.449	0.2741	-0.7225	-0.2302	0.5914	-0.7547
1228	262.3536	4687.377	-0.6039	-0.4679	-0.639	-0.1392	0.5708	0.7209	-0.5919

1229	263.3764	4687.358	-0.62294	-0.7436	-0.8415	0.6819	-0.7177	0.6288	-0.1288
1230	264.3992	4687.339	-0.64198	0.8075	0.7313	-0.4959	-0.8919	0.3942	0.093
1231	265.422	4687.32	-0.66102	1.6142	1.9661	-1.4359	-0.8919	-0.1627	0.3788
1232	266.4448	4687.301	-0.68006	1.6279	1.9897	-1.4359	-0.3521	-0.6871	0.1538
1233	267.4676	4687.282	-0.69909	1.7245	2.1571	-1.4359	-0.8919	-1.1212	0.8222
1234	268.4904	4687.263	-0.71813	1.6176	1.972	-1.3207	-0.8919	-1.0957	0.2876
1235	269.5132	4687.244	-0.73717	1.5487	1.8552	-1.4025	-0.1779	-0.473	0.2691
1236	270.536	4687.225	-0.75621	-0.9746	-0.9855	1.3321	-0.5088	-0.2468	0.2171
1237	271.5588	4687.206	-0.77525	-0.3507	-0.5428	0.6596	-0.4391	0.358	0.3439
1238	272.5815	4687.187	-0.79429	0.6869	0.5712	-0.6445	0.1529	1.2939	-0.2151
1239	273.6043	4687.168	-0.81333	-0.1818	-0.3936	-0.2321	1.2673	1.4356	-0.5434
1240	274.6271	4687.149	-0.83237	1.4556	1.7008	-1.1907	-0.6829	0.5315	0.1695
1241	275.6499	4687.13	-0.8514	1.0213	1.0307	-0.7671	-0.5784	-1.0882	0.2739
1242	276.6726	4687.111	-0.87044	0.0423	-0.1764	0.2435	-0.77	-1.2255	-0.6733
1243	277.6954	4687.092	-0.88948	0.9454	0.9222	-0.7448	-0.3172	-0.6282	0.017
1244	278.7181	4687.073	-0.90852	0.7903	0.7081	-0.9566	1.1454	0.0103	-0.39
1245	279.7409	4687.054	-0.92756	0.5145	0.3534	-0.455	0.0658	2.2398	0.5132
1246	280.7636	4687.035	-0.94659	0.0009	-0.2182	-0.247	0.031	4.2661	-0.2375
1247	281.7864	4687.015	-0.96563	-1.6123	-1.2616	1.1537	-0.5958	3.8186	-0.5637
1248	282.8091	4686.996	-0.98467	0.3077	0.1094	-0.1318	-0.8744	1.7137	-0.0054
1249	283.8319	4686.977	-1.0037	0.3181	0.1211	-0.1318	-0.0212	0.2317	0.5086
1250	284.8546	4686.958	-1.02274	1.0178	1.0257	-0.8414	-0.561	-0.0845	-0.5112
1251	285.8774	4686.939	-1.04178	1.0419	1.0608	-0.912	-0.3869	0.0812	0.203
1252	286.9001	4686.92	-1.06081	1.2901	1.4358	-1.4248	0.0136	-0.1548	0.3
1253	287.9228	4686.901	-1.07985	0.4973	0.3324	-0.5553	0.1703	-0.2581	0.3472
1254	288.9455	4686.882	-1.09888	0.4284	0.2495	-0.1615	-0.7177	-0.0644	-0.2024
1255	289.9683	4686.863	-1.11792	-1.1918	-1.0995	1.5141	-0.3172	0.1003	0.1953
1256	290.991	4686.844	-1.13696	0.3663	0.1766	-0.3138	0.1529	-0.0679	-0.239
1257	292.0137	4686.825	-1.15599	1.497	1.769	-1.3319	-0.2302	-0.2854	0.681
1258	293.0364	4686.806	-1.17503	0.4249	0.2454	-0.4885	0.7623	-0.4968	-0.4217
1259	294.0591	4686.787	-1.19406	-1.0952	-1.0514	1.2058	0.031	-0.2628	-0.0268

1260	295.0818	4686.768	-1.2131	-1.7605	-1.3002	2.0529	-0.265	-0.4582	0.5434
1261	296.1045	4686.749	-1.23213	-0.623	-0.757	1.0906	-0.8919	-0.2977	0.0621
1262	297.1272	4686.73	-1.25117	-1.8536	-1.3195	2.1569	-0.8919	-0.2448	-0.207
1263	298.1499	4686.711	-1.2702	0.8386	0.7736	-0.5293	-0.8919	-0.1996	0.1521
1264	299.1726	4686.692	-1.28923	0.0561	-0.1623	0.1803	-0.0387	-0.0946	0.7086
1265	300.1953	4686.673	-1.30827	-0.6919	-0.8061	0.8342	-0.0038	-0.1974	0.0247
1266	301.218	4686.654	-1.3273	-0.592	-0.7342	0.719	-0.6655	-0.0046	-0.5647
1267	302.2407	4686.635	-1.34634	0.2732	0.0705	-0.1095	-0.6481	-0.2473	-0.2187
1268	303.2633	4686.616	-1.36537	0.842	0.7783	-0.8451	0.031	-0.4789	-0.5454
1269	304.286	4686.597	-1.3844	-0.6988	-0.8109	0.8751	-0.2128	-0.6535	0.3763
1270	305.3087	4686.578	-1.40344	-1.309	-1.1525	1.4658	-0.2128	0.0031	0.3237
1271	306.3313	4686.559	-1.42247	-1.4434	-1.2058	1.607	-0.6655	0.7532	-0.4394
1272	307.354	4686.54	-1.4415	-1.1021	-1.055	1.1723	-0.4565	0.9056	-0.4743
1273	308.3767	4686.521	-1.46054	-0.0301	-0.249	0.1357	-0.5784	0.2128	-0.4116
1274	309.3993	4686.502	-1.47957	0.6283	0.4957	-0.4476	-0.3172	-0.5903	-0.1153
1275	310.422	4686.483	-1.4986	0.8075	0.7313	-0.782	-0.265	-1.4167	0.3434
1276	259.3042	4688.457	0.476054	-0.0198	-0.2388	-0.0946	0.9887	-1.0669	0.3099
1277	260.327	4688.438	0.457004	1.4039	1.6167	-1.3913	0.5882	-0.2977	0.0783
1278	261.3498	4688.419	0.437964	1.6142	1.9661	-1.3987	-0.5088	0.3955	-0.2263
1279	262.3727	4688.4	0.418914	1.69	2.0968	-1.4285	-0.8222	0.8919	0.3443
1280	263.3955	4688.381	0.399874	0.3698	0.1806	-0.3696	-0.5088	0.7858	0.3324
1281	264.4183	4688.362	0.380834	0.0871	-0.1303	-0.4699	-0.8919	0.6268	0.2122
1282	265.4411	4688.343	0.361784	1.3625	1.5503	-1.4359	-0.2824	0.8436	-0.0856
1283	266.4639	4688.324	0.342744	1.0282	1.0407	-0.7263	-0.8919	0.4855	0.1468
1284	267.4867	4688.305	0.323704	1.4487	1.6896	-1.4322	0.4663	-0.1588	0.0126
1285	268.5095	4688.286	0.304664	1.7141	2.139	-1.4359	-0.8919	-0.4304	0.3085
1286	269.5322	4688.267	0.285614	1.366	1.5558	-1.2613	-0.6307	-0.0141	0.3057
1287	270.555	4688.248	0.266574	0.5456	0.3917	-0.9938	0.7623	0.0894	0.3502
1288	271.5778	4688.229	0.247534	0.5731	0.426	-0.7894	-0.3521	0.271	0.3697
1289	272.6006	4688.21	0.228494	0.8799	0.8305	-1.2687	-0.3869	1.7577	-0.0507
1290	273.6234	4688.191	0.209444	-0.6023	-0.7419	-1.1275	4.2274	2.4203	-0.6409

1291	274.6461	4688.172	0.190404	0.6214	0.4869	-0.4996	-0.6481	1.4997	-0.1656
1292	275.6689	4688.152	0.171364	1.5969	1.9367	-1.3282	-0.7351	-0.5002	0.6116
1293	276.6917	4688.133	0.152324	-0.2817	-0.4834	0.6522	-0.8919	-1.525	-0.0419
1294	277.7144	4688.114	0.133284	-0.2714	-0.4743	0.433	0.1877	-1.0876	-0.098
1295	278.7372	4688.095	0.114244	-1.8674	-1.3221	2.2572	-0.5262	0.1855	-0.3298
1296	279.7599	4688.076	0.095204	0.0285	-0.1904	-0.0352	0.2748	4.8218	-0.3245
1297	280.7827	4688.057	0.076164	-1.7502	-1.2978	-0.9752	1.3195	8.2886	-0.4305
1298	281.8054	4688.038	0.057124	-1.2228	-1.1141	-1.0569	-0.0038	7.0214	-0.3466
1299	282.8282	4688.019	0.038084	1.1316	1.1931	-1.3913	-0.474	2.4198	0.1576
1300	283.8509	4688	0.019044	0.9075	0.8689	-0.5665	-0.8396	0.102	0.1601
1301	284.8737	4687.981	3.70E-06	0.3181	0.1211	-0.0835	-0.6829	-0.1877	-0.0324
1302	285.8964	4687.962	-0.01904	0.7662	0.6757	-0.7188	-0.0038	-0.1136	-0.0867
1303	286.9191	4687.943	-0.03808	-0.099	-0.316	0.2583	-0.0909	-0.3051	-0.2427
1304	287.9419	4687.924	-0.05712	0.3732	0.1846	-0.3176	0.0484	-0.4707	0.4471
1305	288.9646	4687.905	-0.07616	-0.3197	-0.5164	0.459	-0.2128	-0.4597	-0.3007
1306	289.9873	4687.886	-0.0952	-1.0815	-1.0442	1.0794	1.0583	-0.2913	0.5016
1307	291.01	4687.867	-0.11424	-1.4951	-1.2242	1.2615	0.6927	-0.5147	-0.7511
1308	292.0327	4687.848	-0.13328	0.3456	0.1527	-0.325	0.0484	-0.6112	0.4012
1309	293.0554	4687.829	-0.15232	-0.6333	-0.7645	0.6224	0.7623	-0.647	-0.0563
1310	294.0781	4687.81	-0.17136	-1.4193	-1.1968	1.8039	-0.6481	-0.5752	-0.1716
1311	295.1009	4687.791	-0.19039	0.8386	0.7736	-0.5033	-0.8919	-0.6482	-0.3039
1312	296.1236	4687.772	-0.20943	-0.8746	-0.926	1.176	-0.8919	-0.5703	0.2807
1313	297.1463	4687.753	-0.22847	-1.4331	-1.202	1.7928	-0.8048	-0.1575	0.7146
1314	298.1689	4687.734	-0.24751	0.8972	0.8545	-0.886	0.0658	-0.4873	-0.5493
1315	299.1916	4687.715	-0.26655	0.356	0.1646	-0.1504	-0.5784	-0.8217	-0.4808
1316	300.2143	4687.696	-0.28558	0.1285	-0.087	-0.0166	-0.0909	-0.5511	0.2235
1317	301.237	4687.676	-0.30462	0.4801	0.3115	-0.1801	-0.5262	0.2319	0.1425
1318	302.2597	4687.657	-0.32366	0.942	0.9173	-0.9083	-0.4043	0.1134	-0.4263
1319	303.2824	4687.638	-0.34269	0.2215	0.0132	0.0317	-0.2824	-0.1119	0.7567
1320	304.305	4687.619	-0.36173	-0.5368	-0.6927	0.9122	-0.5262	-0.5919	0.0419
1321	305.3277	4687.6	-0.38077	-1.2538	-1.1283	1.2986	0.3618	-0.0889	0.0142

1322	306.3504	4687.581	-0.3998	-1.9536	-1.3361	1.4324	-0.8919	0.4544	0.2317
1323	307.373	4687.562	-0.41884	-0.5816	-0.7266	0.7339	-0.8048	0.8086	0.0497
1324	308.3957	4687.543	-0.43788	-1.471	-1.2158	1.5067	-0.8919	0.6127	0.6217
1325	309.4184	4687.524	-0.45691	0.973	0.9614	-0.6817	-0.8222	-0.0856	0.1716
1326	310.441	4687.505	-0.47595	0.7455	0.6482	-1.3802	-0.1257	-0.9791	0.0889
1327	259.3233	4689.48	1.498874	1.5349	1.8321	-1.3913	-0.1431	-1.2933	0.5048
1328	260.3461	4689.461	1.479824	1.5211	1.8091	-1.2464	-0.7526	-0.722	0.689
1329	261.3689	4689.442	1.460774	1.6107	1.9602	-1.3913	-0.7526	-0.3206	0.6427
1330	262.3917	4689.423	1.441724	1.2591	1.3874	-0.99	-0.8396	0.0565	-0.3252
1331	263.4145	4689.404	1.422684	1.4004	1.6112	-1.1907	-0.4391	0.3201	0.5711
1332	264.4373	4689.385	1.403634	0.4973	0.3324	-0.2284	-0.7351	0.3553	-0.0352
1333	265.4601	4689.366	1.384584	0.4422	0.2659	-0.6259	-0.2998	0.8448	-0.4358
1334	266.4829	4689.347	1.365544	-1.6675	-1.2771	1.4175	-0.7351	0.7957	-0.3936
1335	267.5057	4689.328	1.346494	-0.9815	-0.9894	0.6596	0.1529	0.3883	-0.658
1336	268.5285	4689.309	1.327454	0.1112	-0.1052	-0.3027	-0.7177	0.3519	-0.5499
1337	269.5513	4689.29	1.308404	-0.6919	-0.8061	0.5667	-0.2302	-0.1278	-0.6275
1338	270.5741	4689.27	1.289354	-1.2952	-1.1465	1.5364	-0.0387	0.0339	-0.6219
1339	271.5968	4689.251	1.270314	-1.0952	-1.0514	0.89	-0.4217	0.0468	-0.6707
1340	272.6196	4689.232	1.251264	-0.8126	-0.8869	0.8008	-0.2128	1.3294	-0.1593
1341	273.6424	4689.213	1.232224	-1.2641	-1.1329	0.5147	1.215	2.5053	-0.1209
1342	274.6652	4689.194	1.213174	-0.1645	-0.3777	-0.6705	-0.0561	2.0651	-0.7102
1343	275.6879	4689.175	1.194134	1.6383	2.0074	-1.3282	-0.8919	0.4309	0.006
1344	276.7107	4689.156	1.175084	1.7003	2.1149	-1.4359	-0.6829	-1.4863	0.6559
1345	277.7335	4689.137	1.156044	0.487	0.3198	-0.1132	-0.857	-1.4703	0.6049
1346	278.7562	4689.118	1.136994	-1.5468	-1.2414	2.0157	-0.8919	0.8723	0.0461
1347	279.779	4689.099	1.117954	-0.2335	-0.4406	0.1989	-0.4391	7.6062	0.4275
1348	280.8017	4689.08	1.098914	-2.1569	-1.3562	-1.4359	-0.8744	10.4516	-0.495
1349	281.8245	4689.061	1.079864	-0.168	-0.3809	-1.3653	-0.1083	8.6308	-0.3345
1350	282.8472	4689.042	1.060824	0.325	0.129	-1.3096	-0.2824	2.775	0.0048
1351	283.87	4689.023	1.041784	-1.4744	-1.217	1.7519	-0.8919	0.2615	0.2121
1352	284.8927	4689.004	1.022734	-1.0883	-1.0478	1.2949	-0.0038	0.1404	0.6803

1353	285.9154	4688.985	1.003694	0.5352	0.3789	-0.4142	-0.2824	-0.3204	-0.5946
1354	286.9382	4688.966	0.984654	0.3043	0.1054	-0.0612	-0.1083	-0.5215	-0.3063
1355	287.9609	4688.947	0.965604	0.7352	0.6345	-0.429	-0.8919	-0.4416	0.421
1356	288.9836	4688.928	0.946564	-0.1439	-0.3584	0.3921	-0.6655	-0.5594	-0.1536
1357	290.0063	4688.909	0.927524	0.3181	0.1211	-0.2172	0.5882	-0.2693	0.5583
1358	291.0291	4688.89	0.908484	-1.2021	-1.1044	0.942	0.7101	-0.3782	-0.6218
1359	292.0518	4688.871	0.889434	-0.0853	-0.3028	0.1506	0.2748	-0.1775	0.0563
1360	293.0745	4688.852	0.870394	1.0419	1.0608	-1.0755	0.6578	-0.23	0.7854
1361	294.0972	4688.832	0.851354	-1.209	-1.1077	1.5401	-0.7177	-0.519	0.4216
1362	295.1199	4688.813	0.832314	1.1971	1.292	-0.9529	-0.8919	-0.5322	-0.5733
1363	296.1426	4688.794	0.813274	-0.9401	-0.9655	1.2541	-0.7874	-0.2741	0.2212
1364	297.1653	4688.775	0.794234	-1.7157	-1.2895	1.8225	-0.7351	0.055	-0.2538
1365	298.188	4688.756	0.775184	-0.0818	-0.2994	0.3289	-0.4914	-0.1803	-0.2102
1366	299.2107	4688.737	0.756144	-0.5403	-0.6954	0.8862	-0.265	-0.3126	0.819
1367	300.2334	4688.718	0.737104	0.0182	-0.2009	0.3326	-0.7351	-0.3978	-0.3836
1368	301.256	4688.699	0.718064	-1.3641	-1.1753	1.6665	-0.857	0.2569	0.4384
1369	302.2787	4688.68	0.699024	0.8661	0.8114	-0.9009	-0.2998	0.5755	-0.4725
1370	303.3014	4688.661	0.679984	-0.6437	-0.7719	0.563	0.4141	0.2609	0.2126
1371	304.3241	4688.642	0.660944	-1.6261	-1.2656	1.8931	-0.6481	-0.2076	-0.1558
1372	305.3467	4688.623	0.641904	-1.2193	-1.1125	1.4621	-0.2998	-0.3483	-0.227
1373	306.3694	4688.604	0.622864	-1.2469	-1.1252	1.2243	-0.7874	0.1976	0.5794
1374	307.3921	4688.585	0.603824	0.4628	0.2907	-0.3138	-0.77	1.9413	-0.2408
1375	308.4147	4688.566	0.584784	0.1629	-0.0504	-0.3844	-0.6307	3.2478	-0.1539
1376	309.4374	4688.547	0.565744	-0.816	-0.8892	-0.4067	-0.1083	3.0598	-0.0811
1377	310.4601	4688.528	0.546704	-1.6812	-1.2807	-1.0198	0.6056	1.2341	-0.3756
1378	259.3423	4690.503	2.521694	0.3732	0.1846	-0.3547	0.5882	-1.4063	-0.2142
1379	260.3651	4690.484	2.502634	0.2491	0.0436	0.0243	-0.7351	-0.94	-0.238
1380	261.3879	4690.465	2.483584	0.0733	-0.1446	0.2881	-0.8919	-0.2478	-0.3069
1381	262.4107	4690.446	2.464534	-1.3227	-1.1583	1.5476	-0.8919	-0.2455	0.0422
1382	263.4336	4690.427	2.445484	0.4559	0.2824	-0.2507	-0.7351	0.0647	0.3431
1383	264.4564	4690.408	2.426434	1.6314	1.9956	-1.4359	-0.8919	0.2438	-0.4496

1384	265.4792	4690.388	2.407384	1.5762	1.9017	-1.4173	-0.6307	0.6111	-0.1539
1385	266.502	4690.369	2.388334	-0.068	-0.2861	0.3289	-0.474	0.8285	-0.1484
1386	267.5248	4690.35	2.369284	0.649	0.5222	-0.377	-0.3695	0.6575	0.3323
1387	268.5475	4690.331	2.350234	-0.2576	-0.4622	0.5667	-0.4565	0.4719	0.2738
1388	269.5703	4690.312	2.331194	1.0247	1.0357	-0.8191	-0.7526	0.2223	-0.2239
1389	270.5931	4690.293	2.312144	1.6796	2.0789	-1.4285	-0.8919	0.1559	0.3287
1390	271.6159	4690.274	2.293094	1.5452	1.8494	-1.2984	-0.8919	-0.196	-0.3079
1391	272.6387	4690.255	2.274044	1.5728	1.8958	-1.265	-0.8919	0.4589	0.6779
1392	273.6614	4690.236	2.254994	0.8903	0.8449	-0.5962	-0.5958	1.8111	0.2239
1393	274.6842	4690.217	2.235944	-0.7126	-0.8204	0.0057	0.327	1.9891	-0.3918
1394	275.707	4690.198	2.216894	1.6417	2.0133	-1.4322	-0.8919	1.0084	-0.1973
1395	276.7298	4690.179	2.197854	1.6865	2.0908	-1.4359	-0.7177	-0.654	0.3246
1396	277.7525	4690.16	2.178804	1.7038	2.1209	-1.4359	-0.8919	-0.8751	-0.2889
1397	278.7753	4690.141	2.159754	0.549	0.396	-0.481	-0.8919	1.8625	-0.0605
1398	279.798	4690.122	2.140704	-0.4334	-0.6113	-1.213	0.6753	7.5663	-0.3005
1399	280.8208	4690.103	2.121664	-2.2086	-1.3584	-1.4359	-0.6307	9.7532	-0.4776
1400	281.8435	4690.084	2.102614	0.5525	0.4002	-1.1981	-0.1083	6.95	-0.0391
1401	282.8663	4690.065	2.083564	0.78	0.6942	-0.5256	-0.4914	1.7914	0.244
1402	283.889	4690.046	2.064514	0.6111	0.4738	-0.4476	-0.0038	0.5569	-0.5021
1403	284.9117	4690.027	2.045474	0.156	-0.0577	-0.1318	-0.1083	0.3434	0.3068
1404	285.9345	4690.008	2.026424	-1.3124	-1.1539	1.4621	0.1529	-0.2805	0.3142
1405	286.9572	4689.988	2.007384	-1.9708	-1.3385	2.2944	-0.1431	-0.7826	0.3098
1406	287.9799	4689.969	1.988334	-1.5054	-1.2277	1.7705	-0.3347	-0.604	-0.1923
1407	289.0027	4689.95	1.969284	-1.7329	-1.2937	1.9414	-0.7351	-0.6281	0.6822
1408	290.0254	4689.931	1.950244	-1.1642	-1.0862	1.3841	-0.1779	-0.4418	0.0435
1409	291.0481	4689.912	1.931194	-1.8019	-1.3093	2.0046	-0.0735	-0.2635	-0.0353
1410	292.0708	4689.893	1.912154	-0.5403	-0.6954	0.6596	-0.3347	0.0907	-0.6247
1411	293.0935	4689.874	1.893104	-0.2369	-0.4437	0.5147	-0.6481	-0.0561	0.1399
1412	294.1162	4689.855	1.874064	-0.1266	-0.3422	0.1617	-0.0212	-0.2661	0.0388
1413	295.1389	4689.836	1.855014	-0.4369	-0.6141	0.5035	-0.0212	-0.075	-0.5491
1414	296.1616	4689.817	1.835974	-0.4334	-0.6113	0.7042	-0.8396	0.2114	0.1863

1415	297.1843	4689.798	1.816924	-1.9467	-1.3351	1.9674	0.4141	0.2789	0.3286
1416	298.207	4689.779	1.797884	-1.5985	-1.2575	1.8745	-0.8396	0.2408	0.2947
1417	299.2297	4689.76	1.778834	-0.9746	-0.9855	1.2355	-0.857	0.0586	0.1783
1418	300.2524	4689.741	1.759794	-0.8919	-0.9366	1.1909	-0.857	-0.0852	-0.3304
1419	301.2751	4689.722	1.740744	-0.3231	-0.5193	0.6039	-0.6655	-0.0046	0.1033
1420	302.2978	4689.703	1.721704	0.5352	0.3789	-0.3659	-0.857	0.5961	-0.493
1421	303.3204	4689.684	1.702664	-1.2745	-1.1375	1.5773	-0.474	0.5257	0.2663
1422	304.3431	4689.665	1.683614	-1.2814	-1.1405	1.5736	-0.77	-0.1289	0.1465
1423	305.3658	4689.646	1.664574	-0.885	-0.9324	1.2652	-0.7177	-0.1347	-0.4683
1424	306.3885	4689.627	1.645534	-0.4162	-0.5973	0.8231	-0.7874	1.2552	0.4296
1425	307.4111	4689.608	1.626484	-0.2128	-0.422	-0.6036	-0.8919	3.7047	0.0512
1426	308.4338	4689.589	1.607444	-2.1535	-1.356	-1.0792	-0.8919	5.8542	-0.3906
1427	309.4564	4689.57	1.588404	-2.2397	-1.3592	-1.2873	0.5534	5.8206	-0.1583
1428	310.4791	4689.55	1.569354	-1.8777	-1.3239	-0.8303	3.0956	3.6078	0.1369
1429	259.3614	4691.526	3.544504	-0.0301	-0.249	0.3029	-0.1779	-1.536	0.2627
1430	260.3842	4691.507	3.525454	-1.0642	-1.035	1.4696	-0.8919	-1.2815	-0.0385
1431	261.407	4691.488	3.506404	0.7041	0.5937	-0.3696	-0.6829	-0.5835	-0.169
1432	262.4298	4691.468	3.487344	-0.4817	-0.6499	0.7785	-0.5088	-0.0823	-0.0001
1433	263.4526	4691.449	3.468294	0.3284	0.1329	-0.2507	-0.0561	0.07	-0.1981
1434	264.4754	4691.43	3.449244	0.9627	0.9466	-0.7523	-0.6655	0.0519	0.6809
1435	265.4982	4691.411	3.430184	0.3077	0.1094	-0.0129	-0.857	-0.0392	0.5991
1436	266.521	4691.392	3.411134	-0.4748	-0.6445	0.9048	-0.8222	-0.1558	0.3836
1437	267.5438	4691.373	3.392084	0.2526	0.0474	0.1506	-0.8919	-0.1431	0.359
1438	268.5666	4691.354	3.373024	1.5935	1.9309	-1.3839	-0.857	-0.1199	-0.3434
1439	269.5894	4691.335	3.353974	1.6624	2.049	-1.4359	-0.5784	-0.2472	0.6086
1440	270.6122	4691.316	3.334924	1.6693	2.0609	-1.4359	-0.8919	-0.5693	-0.2397
1441	271.6349	4691.297	3.315874	1.6142	1.9661	-1.3207	-0.8919	-0.4342	0.3117
1442	272.6577	4691.278	3.296814	1.6452	2.0193	-1.4136	-0.5088	-0.1204	0.2872
1443	273.6805	4691.259	3.277764	0.811	0.736	-0.6965	-0.4391	0.3124	-0.2533
1444	274.7033	4691.24	3.258714	0.4594	0.2865	-0.3176	-0.8919	0.6476	-0.2391
1445	275.726	4691.221	3.239664	0.2112	0.0019	-1.1312	-0.4043	0.6179	-0.66

1446	276.7488	4691.202	3.220614	0.8592	0.8019	-1.4359	-0.6829	0.2325	0.1144
1447	277.7716	4691.183	3.201564	1.3074	1.4629	-1.3913	-0.8919	-0.3683	-0.2525
1448	278.7943	4691.164	3.182514	0.8627	0.8067	-1.2055	0.832	1.8182	0.026
1449	279.8171	4691.145	3.163464	-0.3197	-0.5164	-0.6297	0.8668	6.0607	-0.2602
1450	280.8398	4691.126	3.144404	-0.6264	-0.7595	-1.187	0.0658	7.2311	-0.5275
1451	281.8626	4691.106	3.125354	1.297	1.4466	-1.0718	-0.7003	3.6224	0.386
1452	282.8853	4691.087	3.106304	0.2457	0.0398	-0.2581	0.327	0.1617	0.2519
1453	283.9081	4691.068	3.087254	-0.4127	-0.5945	0.4292	-0.1954	0.0766	0.4413
1454	284.9308	4691.049	3.068204	-0.0163	-0.2354	0.1283	-0.3695	0.3279	0.5074
1455	285.9535	4691.03	3.049154	0.0216	-0.1974	0.1803	-0.7874	-0.0069	-0.3713
1456	286.9763	4691.011	3.030104	-0.7023	-0.8133	1.0757	-0.6307	-0.301	-0.4095
1457	287.999	4690.992	3.011054	-1.4503	-1.2083	1.8188	-0.6133	-0.2103	0.1276
1458	289.0217	4690.973	2.992014	-0.6609	-0.7843	1.0534	-0.4914	-0.0291	0.1196
1459	290.0444	4690.954	2.972964	-0.7126	-0.8204	1.1315	-0.8919	-0.0607	-0.2339
1460	291.0671	4690.935	2.953914	-1.3538	-1.1711	1.7222	-0.8919	0.0376	0.4418
1461	292.0899	4690.916	2.934864	-0.8264	-0.8958	1.0609	-0.7351	0.1452	-0.1023
1462	293.1126	4690.897	2.915814	-0.1439	-0.3584	0.4032	-0.1779	0.1938	-0.0551
1463	294.1353	4690.878	2.896764	-0.9401	-0.9655	1.3135	-0.8744	0.405	0.31
1464	295.158	4690.859	2.877714	-0.43	-0.6085	0.6336	-0.6307	0.6661	-0.1356
1465	296.1807	4690.84	2.858664	0.3767	0.1886	-0.5888	-0.4217	0.5378	0.269
1466	297.2034	4690.821	2.839624	-0.1921	-0.4031	0.4367	-0.8919	0.6658	-0.3198
1467	298.2261	4690.802	2.820574	-1.0815	-1.0442	1.451	-0.8222	0.5935	0.2602
1468	299.2488	4690.783	2.801524	-1.7743	-1.3033	2.0157	-0.7351	0.3982	-0.3241
1469	300.2715	4690.764	2.782474	-1.0573	-1.0314	1.5141	-0.8919	0.324	0.6947
1470	301.2941	4690.745	2.763434	-0.43	-0.6085	0.7005	-0.2824	0.1481	0.2155
1471	302.3168	4690.725	2.744384	-0.1783	-0.3905	0.4441	-0.8919	-0.078	-0.6382
1472	303.3395	4690.706	2.725334	-1.0297	-1.0164	1.3024	-0.4914	0.1078	0.6527
1473	304.3622	4690.687	2.706284	-1.695	-1.2843	2.0157	-0.3869	-0.3685	-0.1085
1474	305.3848	4690.668	2.687244	-0.3886	-0.5746	0.5073	0.2399	0.8534	-0.057
1475	306.4075	4690.649	2.668194	0.5456	0.3917	-1.0198	-0.3172	2.2727	-0.1327
1476	307.4302	4690.63	2.649144	-1.633	-1.2675	-0.834	-0.1605	4.3039	-0.4557

1477	308.4528	4690.611	2.630104	-1.309	-1.1525	-1.0272	-0.5088	6.2646	-0.2243
1478	309.4755	4690.592	2.611054	-2.1914	-1.3578	-0.73	0.5011	5.5328	-0.3445
1479	310.4981	4690.573	2.592014	-1.9501	-1.3356	-0.1281	0.7449	3.3933	-0.3812
1480	259.3804	4692.548	4.567324	0.2974	0.0976	0.002	-0.561	-1.4658	-0.5858
1481	260.4032	4692.529	4.548274	1.297	1.4466	-1.0272	-0.77	-1.1771	-0.0396
1482	261.426	4692.51	4.529214	0.6731	0.5533	-0.4402	-0.4043	-0.9141	0.5927
1483	262.4489	4692.491	4.510154	0.5697	0.4217	-0.3733	-0.2302	-0.4657	0.4681
1484	263.4717	4692.472	4.491094	1.659	2.043	-1.4173	-0.7351	-0.1851	0.5912
1485	264.4945	4692.453	4.472044	1.1557	1.2293	-0.8712	-0.6655	-0.3407	-0.111
1486	265.5173	4692.434	4.452984	1.0592	1.0859	-0.7225	-0.8919	-0.6352	-0.4776
1487	266.5401	4692.415	4.433934	1.7417	2.1874	-1.4359	-0.8919	-0.6684	0.3488
1488	267.5629	4692.396	4.414874	1.7382	2.1814	-1.4359	-0.8919	-0.6044	-0.3542
1489	268.5856	4692.377	4.395814	1.7245	2.1571	-1.4359	-0.8919	-0.6365	0.5421
1490	269.6084	4692.358	4.376764	1.7382	2.1814	-1.4359	-0.8919	-0.9171	0.5613
1491	270.6312	4692.339	4.357704	1.4384	1.6727	-1.1795	-0.5784	-0.8099	0.6425
1492	271.654	4692.32	4.338654	1.4763	1.7348	-1.3653	-0.0909	-0.411	0.2077
1493	272.6768	4692.301	4.319594	1.266	1.3982	-1.2761	-0.0038	-0.357	-0.2648
1494	273.6996	4692.282	4.300534	1.2453	1.3661	-1.1572	-0.0909	-0.5921	0.157
1495	274.7223	4692.263	4.281484	1.7072	2.1269	-1.4359	-0.8919	0.1634	0.8441
1496	275.7451	4692.244	4.262424	1.0247	1.0357	-1.3542	-0.8396	0.4641	-0.0095
1497	276.7679	4692.224	4.243374	-1.0918	-1.0496	-0.2172	-0.1779	0.542	-0.6393
1498	277.7906	4692.205	4.224324	1.2453	1.3661	-1.2613	0.7623	0.3713	0.2036
1499	278.8134	4692.186	4.205264	1.2488	1.3714	-1.1312	0.0658	1.4363	0.7383
1500	279.8361	4692.167	4.186214	-0.7816	-0.8668	-0.7634	2.4339	4.4852	-0.5054
1501	280.8589	4692.148	4.167154	-1.4848	-1.2206	-1.421	1.8941	4.1672	-0.4366
1502	281.8816	4692.129	4.148104	1.4246	1.6502	-1.3616	-0.5784	1.8034	0.1096
1503	282.9044	4692.11	4.129054	0.387	0.2007	-0.0686	-0.7526	-0.5373	0.189
1504	283.9271	4692.091	4.109994	-0.6609	-0.7843	0.9011	-0.7526	-0.4043	0.6649
1505	284.9498	4692.072	4.090944	1.0592	1.0859	-0.8451	-0.7351	0.2355	-0.4693
1506	285.9726	4692.053	4.071894	-1.1538	-1.0811	1.4324	-0.7874	-0.0255	0.281
1507	286.9953	4692.034	4.052834	-1.7915	-1.3071	2.1903	-0.7526	-0.1987	0.6315

1508	288.018	4692.015	4.033784	-1.4917	-1.223	1.7965	-0.8919	-0.2252	0.0716
1509	289.0408	4691.996	4.014734	-1.1538	-1.0811	1.4547	-0.8744	-0.1951	0.5001
1510	290.0635	4691.977	3.995674	-0.2645	-0.4683	0.5333	-0.4043	0.0194	-0.3204
1511	291.0862	4691.958	3.976624	-0.8884	-0.9345	1.2652	-0.8919	-0.0019	0.1427
1512	292.1089	4691.939	3.957574	-1.7778	-1.3041	2.2275	-0.8919	0.2885	-0.4929
1513	293.1316	4691.92	3.938524	-1.4158	-1.1955	1.5216	-0.8919	0.9756	-0.0583
1514	294.1543	4691.901	3.919474	0.2732	0.0705	-0.4104	-0.4914	1.2357	-0.4354
1515	295.177	4691.882	3.900414	-0.4782	-0.6472	0.6596	-0.7874	1.3698	0.1582
1516	296.1997	4691.862	3.881364	-0.0784	-0.2961	-0.0761	-0.7177	1.2928	0.0889
1517	297.2224	4691.843	3.862314	-1.2435	-1.1236	1.6665	-0.8919	0.7882	0.5152
1518	298.2451	4691.824	3.843264	0.4594	0.2865	-0.1504	-0.8222	0.9096	-0.0847
1519	299.2678	4691.805	3.824214	-1.6261	-1.2656	1.9674	-0.857	0.918	0.6719
1520	300.2905	4691.786	3.805164	0.0526	-0.1659	0.1877	-0.5958	0.0247	-0.5227
1521	301.3132	4691.767	3.786114	-0.461	-0.6335	0.7934	-0.8919	-0.092	-0.0803
1522	302.3359	4691.748	3.767064	-0.7712	-0.8599	0.8454	-0.3172	-0.2892	-0.5146
1523	303.3585	4691.729	3.748014	0.1216	-0.0943	0.1877	-0.5088	-0.1698	-0.1804
1524	304.3812	4691.71	3.728964	-1.1228	-1.0655	1.5847	-0.6133	-0.1035	0.7161
1525	305.4039	4691.691	3.709914	-0.6885	-0.8037	0.2695	-0.3869	0.9473	-0.1748
1526	306.4266	4691.672	3.690864	-1.3813	-1.1822	-0.5368	0.1355	2.1689	-0.5175
1527	307.4492	4691.653	3.671814	-0.523	-0.6822	-1.3244	0.3792	3.2159	-0.0095
1528	308.4719	4691.634	3.652764	0.0285	-0.1904	-0.0278	-0.5958	3.4314	0.6533
1529	309.4945	4691.615	3.633714	-1.2435	-1.1236	0.5296	0.8146	2.7118	-0.3755
1530	310.5172	4691.596	3.614664	-1.9605	-1.3371	1.451	-0.4914	1.4439	-0.4138
1531	259.3995	4693.571	5.590144	1.1798	1.2658	-0.9529	-0.77	-1.5247	-0.4548
1532	260.4223	4693.552	5.571084	1.6245	1.9838	-1.3282	-0.8919	-1.2287	-0.0021
1533	261.4451	4693.533	5.552024	1.7417	2.1874	-1.4359	-0.8919	-0.9561	-0.5729
1534	262.4679	4693.514	5.532964	1.528	1.8206	-1.291	-0.5958	-0.7483	-0.0811
1535	263.4907	4693.495	5.513904	1.6762	2.0729	-1.4025	-0.7351	-0.3947	0.1898
1536	264.5135	4693.476	5.494844	1.4866	1.7519	-1.2167	-0.8919	-0.6404	0.2869
1537	265.5363	4693.457	5.475784	0.8903	0.8449	-0.5591	-0.8919	-0.835	0.5624
1538	266.5591	4693.438	5.456724	1.3418	1.5173	-1.0644	-0.7003	-1.0215	-0.4402

1539	267.5819	4693.419	5.437664	0.8041	0.7267	-0.507	-0.8048	-1.019	-0.5048
1540	268.6047	4693.4	5.418604	1.397	1.6056	-1.0904	-0.8919	-0.9995	0.2039
1541	269.6275	4693.381	5.399544	1.4763	1.7348	-1.1758	-0.77	-1.1845	-0.0825
1542	270.6503	4693.362	5.380484	1.0661	1.096	-0.7337	-0.8919	-0.9896	0.1311
1543	271.6731	4693.343	5.361424	0.9764	0.9663	-0.756	-0.3521	-0.5743	0.1827
1544	272.6958	4693.323	5.342374	-0.3403	-0.534	0.7042	-0.7526	-0.036	0.045
1545	273.7186	4693.304	5.323314	-0.723	-0.8275	1.0051	-0.5436	-0.1106	-0.3957
1546	274.7414	4693.285	5.304254	1.0902	1.1316	-0.938	0.0658	-0.3906	0.5012
1547	275.7641	4693.266	5.285194	-0.3093	-0.5074	0.3438	0.2225	0.1223	-0.0476
1548	276.7869	4693.247	5.266134	-0.4472	-0.6225	0.2063	-0.77	0.6871	0.0646
1549	277.8097	4693.228	5.247074	-0.8298	-0.898	0.8417	-0.6829	0.6586	-0.4604
1550	278.8324	4693.209	5.228024	1.4556	1.7008	-1.3504	-0.3172	2.7188	0.4664
1551	279.8552	4693.19	5.208964	-0.3369	-0.5311	-0.7783	0.3618	4.2823	-0.5644
1552	280.8779	4693.171	5.189904	0.1871	-0.0244	-0.7485	-0.3347	3.9214	0.0457
1553	281.9007	4693.152	5.170844	1.0144	1.0208	-1.0235	-0.2476	1.4849	-0.2059
1554	282.9234	4693.133	5.151794	-0.7678	-0.8576	1.1983	-0.6307	0.2217	0.2944
1555	283.9462	4693.114	5.132734	0.7972	0.7174	-0.4327	-0.8744	0.0502	0.1532
1556	284.9689	4693.095	5.113674	-0.5885	-0.7317	0.5964	0.1007	0.1627	-0.412
1557	285.9916	4693.076	5.094624	-0.1197	-0.3357	0.4701	-0.5436	0.3654	-0.0202
1558	287.0144	4693.057	5.075564	-0.492	-0.658	0.745	-0.265	0.356	-0.0072
1559	288.0371	4693.038	5.056504	-0.1301	-0.3455	0.4887	-0.8919	0.4445	0.0069
1560	289.0598	4693.019	5.037454	-0.1749	-0.3873	0.5444	-0.8396	0.4624	0.2483
1561	290.0825	4693	5.018394	-0.33	-0.5252	0.5407	-0.3695	0.2375	-0.2245
1562	291.1053	4692.98	4.999344	-1.3917	-1.1862	1.685	-0.6655	0.1754	0.6835
1563	292.128	4692.961	4.980284	-1.6054	-1.2595	1.8968	-0.8919	1.2973	-0.4472
1564	293.1507	4692.942	4.961234	-2.2362	-1.3591	1.6145	1.7896	1.7699	0.1739
1565	294.1734	4692.923	4.942174	-1.3779	-1.1808	0.9494	-0.561	2.0222	0.1204
1566	295.1961	4692.904	4.923124	-0.5644	-0.7137	-0.1875	-0.1605	1.7038	-0.7261
1567	296.2188	4692.885	4.904064	0.9868	0.9811	-1.2724	-0.6481	1.4557	-0.6186
1568	297.2415	4692.866	4.885014	0.2664	0.0628	-0.5776	-0.6829	1.1686	-0.432
1569	298.2642	4692.847	4.865954	0.8282	0.7594	-0.9603	-0.8919	0.8675	-0.6311

1570	299.2869	4692.828	4.846904	0.0113	-0.2078	0.1134	-0.3521	0.8414	0.1267
1571	300.3096	4692.809	4.827844	-1.4089	-1.1929	1.7036	-0.2824	0.3954	0.3504
1572	301.3322	4692.79	4.808794	-0.4886	-0.6553	0.8528	-0.4565	-0.0103	0.2415
1573	302.3549	4692.771	4.789734	-0.2817	-0.4834	0.7079	-0.8222	0.0357	0.1584
1574	303.3776	4692.752	4.770684	-1.3365	-1.1641	1.6665	-0.6655	0.1465	-0.5565
1575	304.4003	4692.733	4.751634	0.2353	0.0284	0.0205	-0.8744	0.2478	0.1831
1576	305.4229	4692.714	4.732574	0.1871	-0.0244	-0.5776	-0.8222	1.1593	0.0827
1577	306.4456	4692.695	4.713524	-0.7574	-0.8508	-0.5591	-0.2302	1.6319	-0.5044
1578	307.4683	4692.676	4.694474	1.1109	1.1622	-1.1387	0.2574	1.2615	0.1788
1579	308.4909	4692.657	4.675414	-0.0163	-0.2354	0.132	0.0658	0.9008	0.5418
1580	309.5136	4692.637	4.656364	-0.8574	-0.9153	0.7339	0.536	0.4479	-0.2673
1581	310.5362	4692.618	4.637314	-1.895	-1.3269	2.0009	-0.4565	-0.1663	-0.2779
1582	259.4185	4694.594	6.612964	1.204	1.3025	-1.1944	-0.0909	-1.3146	-0.5582
1583	260.4413	4694.575	6.593904	1.5831	1.9133	-1.2836	-0.8919	-0.9785	0.5803
1584	261.4642	4694.556	6.574834	1.5418	1.8436	-1.3133	-0.5088	-0.9298	-0.2836
1585	262.487	4694.537	6.555774	0.7662	0.6757	-0.455	-0.6481	-0.6669	-0.053
1586	263.5098	4694.518	6.536714	1.0523	1.0758	-0.73	-0.7351	-0.7024	0.5229
1587	264.5326	4694.499	6.517644	1.7417	2.1874	-1.4359	-0.8919	-0.8177	-0.4721
1588	265.5554	4694.48	6.498584	1.297	1.4466	-1.0755	-0.8222	-0.9839	-0.6349
1589	266.5782	4694.461	6.479524	1.5659	1.8842	-1.3467	-0.8919	-0.9549	-0.1936
1590	267.601	4694.442	6.460454	0.6972	0.5847	-0.4216	-0.7177	-1.022	-0.4089
1591	268.6238	4694.423	6.441394	-0.7816	-0.8668	1.1686	-0.5784	-1.1345	-0.6641
1592	269.6466	4694.403	6.422334	-1.016	-1.0088	1.2318	0.1007	-1.3517	-0.6275
1593	270.6693	4694.384	6.403274	-1.8812	-1.3245	2.3352	-0.8919	-1.0483	-0.576
1594	271.6921	4694.365	6.384204	-1.5675	-1.248	1.8708	-0.8919	-0.612	-0.6142
1595	272.7149	4694.346	6.365144	0.0216	-0.1974	0.2249	-0.5262	0.0905	-0.3059
1596	273.7377	4694.327	6.346084	-1.4537	-1.2096	1.5699	-0.6655	0.0134	-0.675
1597	274.7604	4694.308	6.327024	1.0419	1.0608	-0.8043	-0.5958	-0.05	0.2115
1598	275.7832	4694.289	6.307964	-0.1887	-0.4	0.4255	-0.6655	-0.2385	0.5562
1599	276.806	4694.27	6.288894	0.0802	-0.1375	0.1357	-0.0387	0.3687	0.0272
1600	277.8287	4694.251	6.269834	-1.5813	-1.2523	1.5439	-0.5262	1.0766	0.0466

1601	278.8515	4694.232	6.250774	-1.2193	-1.1125	-0.1467	0.0136	3.3369	-0.5314
1602	279.8742	4694.213	6.231714	-1.4331	-1.202	-0.99	0.9016	4.1935	-0.472
1603	280.897	4694.194	6.212654	-0.1232	-0.3389	0.1989	-0.5436	4.6433	0.2689
1604	281.9197	4694.175	6.193594	0.6834	0.5667	-0.5739	-0.7874	2.172	-0.0028
1605	282.9425	4694.156	6.174534	-0.8539	-0.9132	0.6484	0.2399	0.829	-0.4275
1606	283.9652	4694.137	6.155474	-0.7333	-0.8345	0.2286	0.2574	0.5653	-0.6112
1607	284.988	4694.118	6.136414	-0.592	-0.7342	0.2249	0.031	0.284	-0.4656
1608	286.0107	4694.098	6.117354	-1.3641	-1.1753	1.1798	-0.3172	-0.0464	0.0209
1609	287.0334	4694.079	6.098294	-1.4744	-1.217	1.3098	-0.5958	0.1212	-0.1944
1610	288.0561	4694.06	6.079234	-1.4331	-1.202	1.1649	-0.77	0.4919	-0.6374
1611	289.0789	4694.041	6.060174	0.4835	0.3156	-0.8526	0.3444	0.9507	-0.6086
1612	290.1016	4694.022	6.041114	-0.0542	-0.2727	0.2286	-0.7874	1.0449	-0.0148
1613	291.1243	4694.003	6.022054	-1.4158	-1.1955	1.7333	-0.8919	1.3395	0.5762
1614	292.147	4693.984	6.002994	-1.4641	-1.2133	1.2281	-0.8919	1.4704	-0.098
1615	293.1697	4693.965	5.983934	-1.9708	-1.3385	1.6256	-0.7003	1.6117	0.1667
1616	294.1924	4693.946	5.964884	-1.4262	-1.1994	1.5216	0.2922	1.6654	-0.1961
1617	295.2151	4693.927	5.945824	-0.9436	-0.9675	1.2541	-0.8919	1.0515	0.0411
1618	296.2378	4693.908	5.926764	-0.9608	-0.9775	1.2912	-0.7003	0.9357	-0.045
1619	297.2605	4693.889	5.907704	-0.5472	-0.7006	0.7376	-0.5088	0.9931	0.234
1620	298.2832	4693.87	5.888644	0.8282	0.7594	-0.9083	-0.3869	0.8561	0.1127
1621	299.3059	4693.851	5.869594	0.6007	0.4607	-1.0346	-0.4217	0.3966	-0.7029
1622	300.3286	4693.832	5.850534	0.6455	0.5177	-0.5925	-0.8744	0.1906	-0.1467
1623	301.3513	4693.813	5.831474	-0.5747	-0.7214	0.8788	-0.8919	0.1187	0.6519
1624	302.374	4693.794	5.812414	1.1522	1.2241	-0.8637	-0.8919	0.2513	0.1723
1625	303.3966	4693.774	5.793364	0.0457	-0.1729	0.2323	-0.8396	0.5878	0.1459
1626	304.4193	4693.755	5.774304	-1.6537	-1.2733	1.4138	-0.8919	1.2467	-0.4811
1627	305.442	4693.736	5.755244	-1.8053	-1.31	1.1946	-0.4565	1.3871	-0.4292
1628	306.4647	4693.717	5.736194	0.2974	0.0976	-0.7671	-0.1257	1.3907	-0.2261
1629	307.4873	4693.698	5.717134	0.9316	0.9027	-1.0346	0.1703	0.3935	0.0569
1630	308.51	4693.679	5.698074	0.2939	0.0937	-0.4476	1.4066	0.0249	0.1597
1631	309.5326	4693.66	5.679024	0.7007	0.5892	-0.4773	-0.8222	-0.183	-0.0394

1632	310.5553	4693.641	5.659964	-2.1673	-1.3567	2.5619	-0.8919	-0.7433	-0.3412
1633	259.4376	4695.617	7.635784	0.873	0.821	-1.0049	1.0409	-1.1361	-0.7104
1634	260.4604	4695.598	7.616714	1.0144	1.0208	-0.99	0.6578	-0.7646	0.4094
1635	261.4832	4695.579	7.597654	0.4008	0.2169	-0.1764	-0.2998	-1.0344	0.5678
1636	262.506	4695.56	7.578584	1.366	1.5558	-1.1201	-0.7526	-0.6759	0.6449
1637	263.5288	4695.541	7.559514	1.4866	1.7519	-1.3579	-0.0561	-0.5658	-0.4388
1638	264.5517	4695.522	7.540444	0.7938	0.7127	-1.0235	1.8071	-0.6666	0.362
1639	265.5745	4695.502	7.521384	1.4418	1.6783	-1.3096	-0.265	-0.946	-0.3729
1640	266.5972	4695.483	7.502314	1.6693	2.0609	-1.3839	-0.77	-0.8965	0.4474
1641	267.62	4695.464	7.483244	1.6348	2.0015	-1.4359	-0.6829	-0.8906	0.092
1642	268.6428	4695.445	7.464184	1.3763	1.5723	-1.1238	-0.6133	-0.734	0.2443
1643	269.6656	4695.426	7.445114	1.5556	1.8668	-1.2427	-0.8919	-0.8164	0.3952
1644	270.6884	4695.407	7.426054	0.5628	0.4131	-0.2693	-0.857	-0.633	-0.2137
1645	271.7112	4695.388	7.406984	0.5766	0.4303	-0.4216	0.0832	-0.2438	-0.0733
1646	272.734	4695.369	7.387924	0.1285	-0.087	-0.4142	1.9115	0.0314	0.3953
1647	273.7567	4695.35	7.368854	-0.5299	-0.6875	0.6484	0.2225	0.1243	-0.1882
1648	274.7795	4695.331	7.349794	0.6007	0.4607	-0.7448	0.8668	0.1014	-0.4929
1649	275.8023	4695.312	7.330724	0.9592	0.9417	-1.0532	0.7275	-0.387	0.4476
1650	276.825	4695.293	7.311664	0.3629	0.1726	-0.4142	0.1529	-0.4844	0.4355
1651	277.8478	4695.274	7.292594	0.287	0.086	-0.0798	-0.3347	0.9845	0.029
1652	278.8706	4695.255	7.273534	-1.9536	-1.3361	0.6633	-0.6481	3.2132	-0.3495
1653	279.8933	4695.236	7.254464	-1.3779	-1.1808	-0.0055	-0.6133	4.0679	-0.3786
1654	280.9161	4695.217	7.235404	-1.24	-1.122	0.7302	-0.4914	3.3215	0.0262
1655	281.9388	4695.197	7.216334	-1.0091	-1.005	0.6262	-0.6481	2.0058	-0.5814
1656	282.9615	4695.178	7.197274	-0.7747	-0.8622	0.5147	-0.2128	1.6355	0.2122
1657	283.9843	4695.159	7.178214	-0.3197	-0.5164	0.4627	-0.474	0.8257	0.5774
1658	285.007	4695.14	7.159144	-0.6195	-0.7545	0.8565	-0.1605	0.0808	0.5174
1659	286.0298	4695.121	7.140084	0.8075	0.7313	-0.5888	-0.2302	-0.292	-0.4148
1660	287.0525	4695.102	7.121024	-0.199	-0.4094	0.4998	-0.6307	0.1514	0.207
1661	288.0752	4695.083	7.101954	-1.016	-1.0088	1.2058	-0.7526	0.6151	0.1722
1662	289.0979	4695.064	7.082894	-0.6023	-0.7419	0.615	0.0136	1.278	0.2695

1663	290.1207	4695.045	7.063834	-1.1125	-1.0603	0.5481	-0.7351	1.1637	-0.2004
1664	291.1434	4695.026	7.044774	-1.4468	-1.2071	0.8119	-0.4043	0.831	-0.2995
1665	292.1661	4695.007	7.025704	-1.2745	-1.1375	1.2689	-0.7177	0.8257	0.4823
1666	293.1888	4694.988	7.006644	-1.533	-1.2369	1.6702	-0.8222	0.7825	-0.3985
1667	294.2115	4694.969	6.987584	-0.3783	-0.566	0.7005	-0.857	0.3251	0.6546
1668	295.2342	4694.95	6.968524	-1.1297	-1.069	1.5327	-0.8919	0.1816	0.5416
1669	296.2569	4694.931	6.949464	-0.2231	-0.4313	0.5593	-0.6829	0.6173	0.0242
1670	297.2796	4694.912	6.930404	0.325	0.129	-0.1429	-0.857	0.4756	0.5129
1671	298.3023	4694.892	6.911334	-0.3679	-0.5573	0.6819	-0.8222	0.3261	0.1673
1672	299.325	4694.873	6.892274	0.1147	-0.1016	0.1915	-0.7351	0.0712	0.3381
1673	300.3477	4694.854	6.873214	-0.2679	-0.4713	-0.0092	0.1181	0.3956	-0.4355
1674	301.3704	4694.835	6.854154	0.7145	0.6072	-1.1535	0.1877	0.8723	-0.0236
1675	302.393	4694.816	6.835094	1.3177	1.4791	-1.135	-0.6481	1.6595	0.3963
1676	303.4157	4694.797	6.816034	-1.109	-1.0585	0.9866	-0.6829	1.7157	-0.228
1677	304.4384	4694.778	6.796974	-1.8088	-1.3107	1.2541	0.2225	1.833	-0.4678
1678	305.461	4694.759	6.777914	-1.4779	-1.2182	0.8008	-0.6655	1.5151	-0.4273
1679	306.4837	4694.74	6.758854	1.4797	1.7405	-1.3207	-0.4914	1.1891	0.4997
1680	307.5064	4694.721	6.739794	0.6593	0.5355	-0.5962	-0.3695	0.3819	-0.1123
1681	308.529	4694.702	6.720734	-0.8988	-0.9408	1.15	-0.1954	-0.1405	0.2935
1682	309.5517	4694.683	6.701674	1.235	1.3501	-1.0012	-0.5784	-0.4031	0.6261
1683	310.5743	4694.664	6.682614	-1.1573	-1.0828	1.425	-0.5088	-0.9992	-0.3341
1684	259.4567	4696.64	8.658604	0.7869	0.7034	-1.0086	1.1802	-0.8149	-0.5236
1685	260.4795	4696.621	8.639534	1.3729	1.5668	-1.2836	0.2574	-0.2665	-0.0301
1686	261.5023	4696.602	8.620464	1.0316	1.0457	-0.9492	-0.1083	-0.3277	0.3414
1687	262.5251	4696.583	8.601394	0.9523	0.932	-0.8191	-0.0735	-0.5125	-0.4443
1688	263.5479	4696.563	8.582324	1.5866	1.9192	-1.3207	-0.77	-0.7011	-0.1539
1689	264.5707	4696.544	8.563254	0.4973	0.3324	-0.3733	-0.1954	-0.8833	-0.0296
1690	265.5935	4696.525	8.544184	1.7279	2.1632	-1.4359	-0.8919	-0.8961	-0.1162
1691	266.6163	4696.506	8.525114	1.59	1.925	-1.3839	-0.5784	-0.8403	0.7779
1692	267.6391	4696.487	8.506044	1.5866	1.9192	-1.4359	-0.5958	-0.6272	0.1195
1693	268.6619	4696.468	8.486974	1.5797	1.9075	-1.4359	-0.5262	-0.7087	-0.3501

1694	269.6847	4696.449	8.467904	1.4625	1.7121	-1.3319	-0.561	-0.6256	-0.4337
1695	270.7075	4696.43	8.448834	0.6593	0.5355	-0.5776	0.2225	-0.3829	-0.0188
1696	271.7302	4696.411	8.429764	-0.0335	-0.2524	-0.1727	1.424	-0.0113	0.6512
1697	272.753	4696.392	8.410694	0.0182	-0.2009	-0.4885	3.0259	-0.1686	-0.0095
1698	273.7758	4696.373	8.391624	0.7938	0.7127	-1.0198	1.4588	0.1757	0.055
1699	274.7986	4696.354	8.372554	-0.1783	-0.3905	-0.0092	0.4141	-0.1325	-0.349
1700	275.8213	4696.335	8.353494	0.3732	0.1846	-0.9009	1.6155	0.076	-0.1076
1701	276.8441	4696.316	8.334424	0.1457	-0.0688	0.054	-0.2128	0.7198	0.357
1702	277.8669	4696.296	8.315354	-1.1676	-1.0879	1.3098	-0.77	1.3625	-0.5281
1703	278.8896	4696.277	8.296284	-2.0156	-1.3441	1.3061	-0.4217	2.3989	-0.3375
1704	279.9124	4696.258	8.277214	-0.2852	-0.4865	0.2695	-0.2128	2.4541	-0.1995
1705	280.9351	4696.239	8.258154	0.0492	-0.1694	0.1357	-0.5088	1.8917	0.1985
1706	281.9579	4696.22	8.239084	0.2664	0.0628	-0.0872	-0.8919	1.5233	0.2141
1707	282.9806	4696.201	8.220014	-0.0921	-0.3094	-0.1467	-0.8919	1.4447	-0.5506
1708	284.0033	4696.182	8.200954	1.0592	1.0859	-1.2984	-0.8919	0.875	-0.5048
1709	285.0261	4696.163	8.181884	0.0044	-0.2147	0.2583	-0.6133	0.1737	-0.0939
1710	286.0488	4696.144	8.162814	-1.8467	-1.3182	2.2275	-0.8396	-0.5297	0.6943
1711	287.0715	4696.125	8.143754	0.2664	0.0628	-0.0055	-0.561	-0.3237	-0.0902
1712	288.0943	4696.106	8.124684	-0.7953	-0.8758	1.1983	-0.8919	0.0763	-0.156
1713	289.117	4696.087	8.105614	-0.8436	-0.9067	1.2243	-0.6829	0.8096	0.5869
1714	290.1397	4696.068	8.086554	0.8282	0.7594	-0.7894	-0.8919	0.8907	0.302
1715	291.1624	4696.049	8.067484	-0.5678	-0.7163	0.7971	-0.7177	0.5015	0.0767
1716	292.1851	4696.03	8.048424	0.8627	0.8067	-0.8043	-0.8048	0.2245	-0.6137
1717	293.2079	4696.01	8.029354	-1.4606	-1.2121	1.7705	-0.8919	-0.2386	0.1259
1718	294.2306	4695.991	8.010284	-1.0263	-1.0145	1.2875	-0.8919	-0.289	-0.0731
1719	295.2533	4695.972	7.991224	-0.9677	-0.9815	1.3024	-0.6133	-0.0307	0.5358
1720	296.276	4695.953	7.972154	-1.2676	-1.1345	0.4552	-0.8919	0.1146	-0.5956
1721	297.2987	4695.934	7.953094	-1.764	-1.301	2.2089	-0.8919	0.3063	-0.1336
1722	298.3214	4695.915	7.934034	-0.916	-0.9512	1.0794	-0.8222	-0.0448	0.386
1723	299.344	4695.896	7.914964	-1.1469	-1.0777	1.3358	-0.6829	-0.0372	0.5267
1724	300.3667	4695.877	7.895904	0.6731	0.5533	-0.5553	0.1703	0.6277	0.2882

1725	301.3894	4695.858	7.876834	-1.047	-1.0258	0.5481	-0.7177	1.7197	-0.3606
1726	302.4121	4695.839	7.857774	-0.9711	-0.9835	-0.3844	-0.3172	2.0613	-0.4438
1727	303.4348	4695.82	7.838704	-1.1332	-1.0708	-0.3919	0.6404	1.3048	-0.5367
1728	304.4574	4695.801	7.819644	1.2522	1.3768	-1.4359	-0.5958	1.0339	0.5513
1729	305.4801	4695.782	7.800584	0.4801	0.3115	-0.3584	-0.5088	0.9552	-0.303
1730	306.5028	4695.763	7.781514	-0.3197	-0.5164	0.2063	-0.6133	0.4528	-0.5055
1731	307.5254	4695.744	7.762454	-0.4541	-0.628	0.1469	1.7374	0.2777	0.2681
1732	308.5481	4695.725	7.743394	-0.0784	-0.2961	-0.1429	1.6503	-0.0779	0.1012
1733	309.5708	4695.705	7.724324	1.1591	1.2345	-1.2687	0.7623	-0.8047	-0.2779
1734	310.5934	4695.686	7.705264	1.5349	1.8321	-1.3133	-0.5784	-1.3135	0.253
1735	259.4757	4697.663	9.681424	-0.2438	-0.4499	0.2843	0.2574	-0.6742	-0.5769
1736	260.4986	4697.643	9.662344	0.8524	0.7925	-0.8563	0.5011	-0.0711	-0.3089
1737	261.5214	4697.624	9.643274	0.6972	0.5847	-0.7671	0.5708	0.1103	0.3599
1738	262.5442	4697.605	9.624204	1.3522	1.5338	-1.0606	-0.8048	0.0732	0.45
1739	263.567	4697.586	9.605124	1.4866	1.7519	-1.4359	-0.0561	-0.4303	0.7323
1740	264.5898	4697.567	9.586054	1.6279	1.9897	-1.4359	-0.6133	-0.6355	-0.2422
1741	265.6126	4697.548	9.566974	1.6142	1.9661	-1.369	-0.77	-0.7561	0.1747
1742	266.6354	4697.529	9.547904	0.7352	0.6345	-0.7634	-0.1257	-0.8574	-0.0552
1743	267.6582	4697.51	9.528834	1.3349	1.5064	-1.2464	-0.561	-0.4631	0.3544
1744	268.681	4697.491	9.509764	1.5487	1.8552	-1.4359	-0.8222	-0.5256	0.275
1745	269.7038	4697.472	9.490684	1.0488	1.0708	-1.1424	-0.6481	-0.0211	0.718
1746	270.7265	4697.453	9.471614	1.2074	1.3078	-1.3244	0.0484	-0.0064	-0.2189
1747	271.7493	4697.434	9.452544	0.1595	-0.0541	-0.3287	0.4141	0.1128	0.371
1748	272.7721	4697.415	9.433474	-1.5227	-1.2335	1.2503	2.016	-0.0475	0.779
1749	273.7949	4697.396	9.414394	-0.3989	-0.5831	0.0763	2.8344	-0.0712	0.0577
1750	274.8176	4697.376	9.395324	-1.6812	-1.2807	1.2764	3.1304	0.2419	0.2014
1751	275.8404	4697.357	9.376254	-0.4024	-0.586	-0.1132	0.6578	0.784	-0.4423
1752	276.8632	4697.338	9.357184	-1.0987	-1.0532	0.9643	-0.3869	1.5576	-0.2054
1753	277.8859	4697.319	9.338114	-1.7467	-1.297	0.5556	0.0832	2.0291	-0.3843
1754	278.9087	4697.3	9.319044	-0.9125	-0.9491	0.1766	0.7449	2.0375	-0.1489
1755	279.9314	4697.281	9.299974	0.8213	0.7501	-0.5553	-0.8048	1.4979	0.099

1756	280.9542	4697.262	9.280894	-0.6506	-0.7769	1.0088	-0.7526	0.9841	0.29
1757	281.9769	4697.243	9.261824	-1.4606	-1.2121	1.6999	-0.8919	1.0428	0.4276
1758	282.9997	4697.224	9.242754	-0.9401	-0.9655	1.1352	-0.8919	1.2459	0.2395
1759	284.0224	4697.205	9.223684	-0.1163	-0.3324	-1.0532	0.2399	1.0779	-0.4508
1760	285.0452	4697.186	9.204614	-0.5506	-0.7032	0.4107	1.3892	0.8582	0.5313
1761	286.0679	4697.167	9.185544	-1.1366	-1.0725	1.2206	-0.0735	0.0082	0.3253
1762	287.0906	4697.148	9.166474	-0.3851	-0.5717	0.6893	-0.7874	-0.265	0.2564
1763	288.1133	4697.129	9.147404	-1.2986	-1.148	1.6182	-0.8919	-0.256	0.8209
1764	289.1361	4697.109	9.128334	-1.2193	-1.1125	1.4881	-0.7874	-0.0933	0.373
1765	290.1588	4697.09	9.109264	0.5594	0.4088	-0.4104	-0.8919	-0.1161	0.0556
1766	291.1815	4697.071	9.090204	0.4387	0.2618	-0.2544	-0.8048	-0.2019	0.4942
1767	292.2042	4697.052	9.071134	-1.3365	-1.1641	1.6925	-0.7003	-0.3879	0.4032
1768	293.2269	4697.033	9.052064	-1.7295	-1.2929	2.064	-0.8919	-0.2465	-0.083
1769	294.2496	4697.014	9.032994	0.0457	-0.1729	0.1654	-0.7526	-0.0243	-0.3783
1770	295.2723	4696.995	9.013924	1.0419	1.0608	-0.9752	0.2922	0.145	-0.2842
1771	296.295	4696.976	8.994854	-0.6678	-0.7891	1.0126	-0.8048	0.0871	0.5276
1772	297.3177	4696.957	8.975784	0.1698	-0.043	0.1915	-0.6133	0.1107	-0.1246
1773	298.3404	4696.938	8.956724	-1.1297	-1.069	1.1798	-0.1257	-0.1815	-0.0625
1774	299.3631	4696.919	8.937654	-1.4399	-1.2045	1.7185	-0.8919	0.1712	0.4712
1775	300.3858	4696.9	8.918584	0.3973	0.2128	-0.3473	-0.1954	1.703	0.1238
1776	301.4085	4696.881	8.899514	-1.1538	-1.0811	0.563	-0.8744	2.726	-0.5002
1777	302.4312	4696.862	8.880454	-1.4262	-1.1994	0.6039	0.6404	2.1718	-0.3001
1778	303.4538	4696.842	8.861384	0.7352	0.6345	-0.8414	1.1628	1.3743	0.3801
1779	304.4765	4696.823	8.842314	0.4732	0.3031	-0.678	1.511	0.2396	0.5125
1780	305.4992	4696.804	8.823244	-0.6023	-0.7419	0.3809	1.9812	-0.0989	0.0569
1781	306.5218	4696.785	8.804184	-0.8884	-0.9345	0.4664	0.5185	0.2682	-0.5429
1782	307.5445	4696.766	8.785114	0.1147	-0.1016	-0.7523	0.2748	0.3556	0.0628
1783	308.5672	4696.747	8.766054	0.5766	0.4303	-0.6371	-0.1257	-0.2047	0.5107
1784	309.5898	4696.728	8.746984	0.942	0.9173	-0.8489	-0.561	-0.7403	0.0524
1785	310.6125	4696.709	8.727914	1.1419	1.2086	-1.4099	1.424	-1.349	0.3062
1786	259.4948	4698.685	10.70424	1.4659	1.7178	-1.2984	-0.7003	-0.7516	-0.6533

1787	260.5176	4698.666	10.68516	1.2901	1.4358	-0.9529	-0.8919	0.1622	0.7283
1788	261.5404	4698.647	10.66608	0.4697	0.299	-0.3621	-0.6655	0.1327	-0.5193
1789	262.5633	4698.628	10.647	-0.3714	-0.5602	0.4441	0.4837	0.2836	-0.6349
1790	263.5861	4698.609	10.62793	1.3798	1.5779	-1.1127	-0.7874	0.24	0.4319
1791	264.6089	4698.59	10.60885	1.6417	2.0133	-1.4359	-0.6655	-0.4934	0.042
1792	265.6317	4698.571	10.58977	1.0419	1.0608	-0.8303	-0.8222	-0.6967	0.3046
1793	266.6545	4698.552	10.5707	1.204	1.3025	-1.0272	-0.8919	-0.7422	0.282
1794	267.6773	4698.533	10.55162	1.2143	1.3183	-1.2799	-0.8744	-0.6004	0.4704
1795	268.7	4698.514	10.53254	1.6245	1.9838	-1.4359	-0.8919	-0.5477	0.2462
1796	269.7228	4698.495	10.51347	1.3625	1.5503	-1.3207	0.1877	-0.2378	0.1971
1797	270.7456	4698.476	10.49439	1.3143	1.4737	-1.4099	0.4315	0.0468	-0.2046
1798	271.7684	4698.456	10.47532	0.0354	-0.1834	0.054	0.6056	0.239	-0.6357
1799	272.7912	4698.437	10.45624	-0.3369	-0.5311	0.2472	1.3195	-0.2102	0.0121
1800	273.8139	4698.418	10.43716	-0.0887	-0.3061	0.2843	-0.2998	-0.3112	0.4432
1801	274.8367	4698.399	10.41809	-0.2817	-0.4834	0.1134	1.9289	0.3292	-0.0851
1802	275.8595	4698.38	10.39901	-1.0366	-1.0202	1.3024	-0.8919	1.0122	0.3061
1803	276.8822	4698.361	10.37994	-1.8295	-1.3149	1.986	-0.5784	1.4584	-0.5299
1804	277.905	4698.342	10.36087	-1.3331	-1.1626	1.5662	-0.77	1.8975	-0.2946
1805	278.9278	4698.323	10.34179	-0.6575	-0.7818	0.7971	-0.4217	1.2621	-0.238
1806	279.9505	4698.304	10.32272	-0.1818	-0.3936	0.4887	-0.8919	0.6056	0.1355
1807	280.9733	4698.285	10.30364	-1.1987	-1.1028	1.3098	-0.474	0.2321	0.3472
1808	281.996	4698.266	10.28457	-1.2124	-1.1093	1.4956	-0.8396	0.5566	0.2791
1809	283.0188	4698.247	10.26549	-0.2852	-0.4865	0.459	-0.5262	0.8822	-0.0045
1810	284.0415	4698.228	10.24642	-1.0815	-1.0442	1.2392	-0.6133	0.7639	-0.2708
1811	285.0642	4698.208	10.22735	1.0902	1.1316	-1.0049	-0.7177	0.5651	-0.4921
1812	286.087	4698.189	10.20827	0.5697	0.4217	-0.5145	-0.265	0.0546	-0.2348
1813	287.1097	4698.17	10.1892	0.5938	0.452	-0.2693	-0.7526	-0.3265	-0.3674
1814	288.1324	4698.151	10.17013	-0.4506	-0.6252	0.8714	-0.8919	-0.3008	-0.2567
1815	289.1551	4698.132	10.15106	-0.1611	-0.3745	0.3847	-0.6133	0.0826	-0.0893
1816	290.1779	4698.113	10.13198	0.5387	0.3831	-0.3399	-0.5784	0.0135	-0.1323
1817	291.2006	4698.094	10.11291	0.1285	-0.087	-0.4402	0.2051	-0.3248	-0.4231

1818	292.2233	4698.075	10.09384	-0.361	-0.5515	0.5816	-0.5262	-0.3535	-0.4711
1819	293.246	4698.056	10.07477	-1.7467	-1.297	2.1309	-0.8919	-0.2384	-0.173
1820	294.2687	4698.037	10.05569	-0.8539	-0.9132	1.0386	-0.2128	-0.2911	-0.137
1821	295.2914	4698.018	10.03662	-0.4093	-0.5917	0.6336	-0.5262	-0.1279	-0.2425
1822	296.3141	4697.999	10.01755	0.4766	0.3073	-0.3844	-0.6655	-0.0928	-0.3663
1823	297.3368	4697.98	9.998484	0.5662	0.4174	-0.3919	-0.3695	-0.1995	0.1719
1824	298.3595	4697.961	9.979414	0.7938	0.7127	-0.4922	-0.8919	-0.0743	-0.5024
1825	299.3822	4697.941	9.960344	-0.5161	-0.6768	0.8491	-0.8396	1.1987	0.5663
1826	300.4049	4697.922	9.941264	-0.885	-0.9324	-0.455	-0.1779	2.4683	-0.476
1827	301.4275	4697.903	9.922194	-1.7192	-1.2904	-0.1244	0.5011	2.8233	-0.4164
1828	302.4502	4697.884	9.903124	0.2698	0.0666	0.0057	-0.3695	2.0992	0.1739
1829	303.4729	4697.865	9.884054	1.1281	1.1879	-1.0755	-0.2998	0.3203	-0.3917
1830	304.4956	4697.846	9.864984	-0.0853	-0.3028	0.2026	-0.0561	-0.422	0.3083
1831	305.5182	4697.827	9.845914	0.0423	-0.1764	-0.3584	2.016	0.0048	0.234
1832	306.5409	4697.808	9.826844	-0.8505	-0.911	-0.1838	3.4612	0.2074	-0.4476
1833	307.5636	4697.789	9.807774	-0.6575	-0.7818	0.6967	0.2922	0.4904	-0.4376
1834	308.5862	4697.77	9.788704	0.2732	0.0705	-0.7523	2.0508	-0.0826	0.6525
1835	309.6089	4697.751	9.769634	0.9351	0.9076	-1.1461	0.6927	-0.8338	-0.1001
1836	310.6315	4697.732	9.750564	0.4594	0.2865	-1.1052	3.1826	-1.2832	0.3801
1837	259.5139	4699.708	11.72705	1.3487	1.5283	-1.3765	0.1007	-0.9996	0.0763
1838	260.5367	4699.689	11.70797	1.7382	2.1814	-1.4359	-0.8919	-0.5495	0.3529
1839	261.5595	4699.67	11.68889	1.4625	1.7121	-1.2538	-0.8048	-0.1196	0.3213
1840	262.5823	4699.651	11.66981	0.6352	0.5045	-0.6742	0.5011	0.2536	-0.3373
1841	263.6051	4699.632	11.65073	1.3729	1.5668	-1.3765	-0.3695	0.3968	0.1326
1842	264.6279	4699.613	11.63165	1.5004	1.7747	-1.3133	-0.4217	-0.0499	-0.0109
1843	265.6507	4699.594	11.61257	1.6314	1.9956	-1.3987	-0.5262	-0.6513	0.3932
1844	266.6735	4699.575	11.59349	1.4901	1.7576	-1.4359	-0.2998	-0.9349	-0.7145
1845	267.6963	4699.556	11.57441	1.6004	1.9426	-1.4359	-0.2824	-0.7743	0.2814
1846	268.7191	4699.536	11.55533	1.3246	1.49	-1.4359	0.623	-0.6099	-0.153
1847	269.7419	4699.517	11.53625	1.1591	1.2345	-1.0384	-0.0735	-0.1747	0.4481
1848	270.7647	4699.498	11.51717	0.8627	0.8067	-0.9009	0.3792	-0.1511	0.3177

1849	271.7875	4699.479	11.49809	-1.016	-1.0088	1.3507	-0.6829	-0.3929	-0.1835
1850	272.8102	4699.46	11.47901	0.0147	-0.2044	0.0354	-0.1257	-0.7269	-0.3034
1851	273.833	4699.441	11.45994	0.2043	-0.0057	-0.0538	-0.0735	-0.8034	-0.0694
1852	274.8558	4699.422	11.44086	-1.0746	-1.0405	1.1389	-0.1954	0.0106	0.246
1853	275.8786	4699.403	11.42178	-0.8402	-0.9045	1.0683	-0.8919	0.6067	-0.191
1854	276.9013	4699.384	11.4027	-2.1466	-1.3556	2.6733	-0.8919	0.4817	-0.5331
1855	277.9241	4699.365	11.38362	-0.6195	-0.7545	0.6596	-0.265	0.143	-0.1925
1856	278.9468	4699.346	11.36454	-0.8229	-0.8936	1.1426	-0.3521	-0.097	0.0943
1857	279.9696	4699.327	11.34547	0.3387	0.1448	-0.3436	-0.8048	-0.0993	-0.2974
1858	280.9923	4699.308	11.32639	-0.6471	-0.7744	1.0088	-0.8919	0.086	0.1825
1859	282.0151	4699.288	11.30731	-0.723	-0.8275	0.9308	-0.8919	0.1203	0.5938
1860	283.0378	4699.269	11.28824	0.0285	-0.1904	-0.1838	-0.6307	0.1413	-0.4705
1861	284.0606	4699.25	11.26916	-0.1507	-0.3649	0.3549	-0.77	-0.062	0.2636
1862	285.0833	4699.231	11.25008	-0.6127	-0.7495	0.8008	-0.6829	0.092	-0.0588
1863	286.106	4699.212	11.231	0.4628	0.2907	-0.3696	-0.5088	-0.1602	-0.4243
1864	287.1288	4699.193	11.21193	-0.7953	-0.8758	1.0126	-0.1954	-0.0875	0.6055
1865	288.1515	4699.174	11.19285	-1.8605	-1.3208	2.1903	-0.3172	0.037	0.4616
1866	289.1742	4699.155	11.17378	-0.5368	-0.6927	0.641	-0.561	0.4794	-0.4062
1867	290.1969	4699.136	11.1547	0.1078	-0.1088	0.2212	-0.8222	0.254	-0.0086
1868	291.2196	4699.117	11.13562	0.2284	0.0208	-0.0315	0.0658	-0.1729	0.8769
1869	292.2424	4699.098	11.11655	0.0526	-0.1659	0.2286	-0.6829	-0.3305	0.2062
1870	293.2651	4699.079	11.09747	-0.5678	-0.7163	0.7228	-0.0387	-0.4101	0.3731
1871	294.2878	4699.06	11.0784	-1.1228	-1.0655	1.4027	-0.2998	-0.2284	0.6549
1872	295.3105	4699.04	11.05932	-0.8988	-0.9408	0.8194	0.7623	0.0583	0.5234
1873	296.3332	4699.021	11.04025	1.2832	1.425	-0.9529	-0.8744	0.3348	-0.3635
1874	297.3559	4699.002	11.02117	-0.7747	-0.8622	0.9903	-0.2476	0.264	0.7776
1875	298.3786	4698.983	11.0021	-0.2748	-0.4774	0.3364	0.3444	0.5512	0.2985
1876	299.4013	4698.964	10.98302	0.0526	-0.1659	-0.5888	0.1007	1.5157	-0.3017
1877	300.4239	4698.945	10.96395	-1.1263	-1.0673	-0.1727	0.3444	2.7135	-0.4703
1878	301.4466	4698.926	10.94487	0.5387	0.3831	-1.4248	0.7623	2.4042	-0.2469
1879	302.4693	4698.907	10.9258	0.8075	0.7313	-0.6594	-0.2998	1.3571	0.0505

1880	303.492	4698.888	10.90673	-0.4817	-0.6499	0.9122	-0.857	0.1834	0.6161
1881	304.5146	4698.869	10.88765	-1.1056	-1.0567	1.3358	-0.8048	-0.1597	0.4694
1882	305.5373	4698.85	10.86858	0.1492	-0.0651	-0.429	2.3991	0.1063	0.1686
1883	306.56	4698.831	10.84951	-0.099	-0.316	-0.9715	4.2274	0.1744	-0.3091
1884	307.5826	4698.812	10.83043	-1.3951	-1.1876	0.9977	-0.6133	0.4361	-0.6
1885	308.6053	4698.792	10.81136	0.3387	0.1448	-0.704	-0.4217	0.2076	0.2565
1886	309.628	4698.773	10.79229	0.2353	0.0284	-0.7337	2.7299	-0.864	0.5051
1887	310.6506	4698.754	10.77321	-0.0715	-0.2895	-0.4327	2.9388	-1.4563	-0.061
1888	259.533	4700.731	12.74987	1.6555	2.0371	-1.3839	-0.8919	-0.8521	0.3895
1889	260.5558	4700.712	12.73079	0.7524	0.6573	-1.4359	-0.77	-0.6933	-0.1931
1890	261.5786	4700.693	12.7117	0.5731	0.426	-1.4359	-0.5784	-0.6229	-0.283
1891	262.6014	4700.674	12.69262	0.3663	0.1766	-0.4736	0.2225	0.1728	-0.1801
1892	263.6242	4700.655	12.67353	0.68	0.5622	-0.7151	-0.1431	0.4161	-0.0179
1893	264.647	4700.636	12.65445	1.1867	1.2763	-1.1795	0.0136	-0.0337	-0.3556
1894	265.6698	4700.616	12.63537	0.3077	0.1094	-0.4885	1.7896	-0.6684	0.4866
1895	266.6926	4700.597	12.61628	-1.1745	-1.0912	1.2689	0.9713	-0.9647	-0.3738
1896	267.7154	4700.578	12.5972	1.7245	2.1571	-1.4359	-0.8222	-0.3802	0.6706
1897	268.7382	4700.559	12.57812	1.6934	2.1028	-1.4359	-0.8919	-0.5657	-0.5246
1898	269.761	4700.54	12.55904	0.8765	0.8257	-0.6036	-0.5958	-0.239	0.0478
1899	270.7838	4700.521	12.53995	1.2419	1.3608	-1.317	0.5534	-0.0869	0.4014
1900	271.8066	4700.502	12.52087	-0.8091	-0.8847	0.8194	1.0061	-0.5828	0.1738
1901	272.8293	4700.483	12.50179	1.135	1.1982	-0.9157	-0.8222	-0.9221	-0.3854
1902	273.8521	4700.464	12.48271	1.6486	2.0252	-1.3727	-0.8222	-0.6874	0.8376
1903	274.8749	4700.445	12.46362	-0.1301	-0.3455	0.132	-0.6307	-0.0542	-0.1909
1904	275.8976	4700.426	12.44454	-1.3124	-1.1539	1.5253	-0.8919	0.401	-0.3181
1905	276.9204	4700.407	12.42546	-2.1914	-1.3578	2.6585	-0.8744	-0.0421	-0.5009
1906	277.9432	4700.387	12.40638	-0.2576	-0.4622	0.2695	0.5011	-0.6907	-0.0163
1907	278.9659	4700.368	12.3873	-1.4365	-1.2033	1.9265	-0.8919	-0.6484	0.533
1908	279.9887	4700.349	12.36822	-0.0473	-0.266	0.4924	-0.8919	-0.3723	0.0212
1909	281.0114	4700.33	12.34914	0.1078	-0.1088	0.2137	-0.5958	-0.123	0.0606
1910	282.0342	4700.311	12.33006	-0.7781	-0.8645	0.7079	-0.474	-0.1797	0.0429

1911	283.0569	4700.292	12.31098	-0.654	-0.7793	0.7971	-0.5958	-0.2681	-0.16
1912	284.0796	4700.273	12.2919	-0.5472	-0.7006	0.641	-0.6655	-0.5434	0.3177
1913	285.1024	4700.254	12.27282	0.0526	-0.1659	0.1134	-0.1083	-0.3202	-0.2253
1914	286.1251	4700.235	12.25374	-1.2469	-1.1252	1.3767	-0.7177	-0.1719	-0.0126
1915	287.1478	4700.216	12.23466	-1.0849	-1.046	1.4138	-0.8919	-0.0127	0.0496
1916	288.1706	4700.197	12.21558	0.156	-0.0577	-0.2172	-0.1779	0.3155	-0.419
1917	289.1933	4700.178	12.1965	0.9661	0.9515	-1.2836	0.2051	0.5388	-0.5181
1918	290.216	4700.159	12.17742	0.8558	0.7972	-0.8377	0.0832	0.3232	-0.2051
1919	291.2387	4700.139	12.15834	0.742	0.6436	-0.7077	0.1877	-0.0654	-0.2413
1920	292.2614	4700.12	12.13926	0.4353	0.2577	-0.247	-0.3869	-0.3507	-0.339
1921	293.2841	4700.101	12.12018	-0.0439	-0.2626	0.1209	0.2399	-0.3849	-0.582
1922	294.3069	4700.082	12.1011	0.0423	-0.1764	0.1283	0.2225	-0.1468	0.1499
1923	295.3296	4700.063	12.08202	0.4146	0.2331	-0.3138	-0.5088	0.1121	-0.413
1924	296.3523	4700.044	12.06294	0.7627	0.6711	-0.7225	-0.4217	0.3139	-0.3263
1925	297.3749	4700.025	12.04387	0.0837	-0.1339	0.158	-0.8744	0.7002	-0.3793
1926	298.3976	4700.006	12.02479	0.0768	-0.1411	-0.3547	-0.1605	1.2679	0.058
1927	299.4203	4699.987	12.00571	-0.9505	-0.9715	-0.9566	-0.6829	1.325	-0.5557
1928	300.443	4699.968	11.98663	0.5628	0.4131	-0.8191	-0.0909	1.7427	0.3272
1929	301.4657	4699.949	11.96756	1.3384	1.5119	-1.0495	-0.6655	1.4643	0.0068
1930	302.4884	4699.93	11.94848	0.9075	0.8689	-0.8377	-0.265	0.4663	0.0425
1931	303.5111	4699.911	11.9294	0.9006	0.8593	-0.8043	-0.0909	0.1019	-0.1638
1932	304.5337	4699.891	11.91032	-0.2438	-0.4499	0.3995	0.0484	-0.0254	0.0114
1933	305.5564	4699.872	11.89125	-0.4265	-0.6057	-0.2767	4.3666	0.0234	0.2375
1934	306.5791	4699.853	11.87217	0.0354	-0.1834	-1.1127	6.0556	0.3771	0.1562
1935	307.6017	4699.834	11.85309	-1.6778	-1.2798	1.0869	2.3468	0.4129	-0.5008
1936	308.6244	4699.815	11.83402	-1.3882	-1.1849	1.3209	-0.2128	0.1414	-0.5262
1937	309.647	4699.796	11.81494	1.0213	1.0307	-1.1647	0.3967	-0.3839	0.32
1938	310.6697	4699.777	11.79586	0.4146	0.2331	-1.3356	3.0956	-1.0518	0.2181
1939	259.5521	4701.754	13.77269	1.204	1.3025	-1.3765	-0.8919	-0.911	-0.5947
1940	260.5749	4701.735	13.7536	0.9075	0.8689	-1.1833	-0.8919	-0.6403	-0.318
1941	261.5977	4701.716	13.73451	1.4073	1.6223	-1.3876	-0.8396	-0.9466	0.3057

1942	262.6205	4701.697	13.71543	0.3663	0.1766	-0.6519	-0.7177	-0.2702	-0.5033
1943	263.6433	4701.677	13.69634	0.3973	0.2128	-0.4773	-0.5088	0.3965	-0.3039
1944	264.6661	4701.658	13.67725	1.3935	1.6	-1.3876	0.536	0.0558	0.6156
1945	265.6889	4701.639	13.65817	0.6938	0.5802	-0.7746	1.128	-0.5756	-0.537
1946	266.7117	4701.62	13.63908	-1.3055	-1.151	1.6293	-0.4217	-0.9102	-0.2323
1947	267.7345	4701.601	13.61999	-0.0646	-0.2828	0.3141	-0.857	-0.5884	-0.346
1948	268.7573	4701.582	13.60091	-0.1576	-0.3713	0.2992	-0.2302	-0.3374	-0.5359
1949	269.7801	4701.563	13.58182	-0.5816	-0.7266	0.9383	-0.6133	-0.2341	-0.1931
1950	270.8029	4701.544	13.56273	-0.0267	-0.2456	0.236	-0.2998	-0.2248	-0.2926
1951	271.8256	4701.525	13.54365	-0.7264	-0.8298	0.5593	1.2673	-0.4458	-0.6618
1952	272.8484	4701.506	13.52456	0.6766	0.5577	-0.6891	-0.4043	-0.7859	-0.0683
1953	273.8712	4701.487	13.50548	0.9385	0.9125	-0.9083	0.2399	-0.5927	0.0148
1954	274.894	4701.468	13.48639	-1.9708	-1.3385	2.0454	-0.77	0.1617	-0.1538
1955	275.9167	4701.448	13.46731	-1.4262	-1.1994	1.4696	-0.6829	0.3877	-0.3887
1956	276.9395	4701.429	13.44822	-1.3331	-1.1626	1.2652	0.2399	-0.3555	-0.4795
1957	277.9622	4701.41	13.42914	0.5352	0.3789	-0.3287	-0.5088	-0.7615	0.1284
1958	278.985	4701.391	13.41005	-0.9125	-0.9491	1.3321	-0.8919	-0.6841	0.3145
1959	280.0077	4701.372	13.39097	0.0595	-0.1588	0.2063	-0.6307	-0.1069	0.0871
1960	281.0305	4701.353	13.37188	0.0699	-0.1482	-0.024	-0.265	0.1891	0.3702
1961	282.0532	4701.334	13.3528	0.1043	-0.1124	0.132	-0.8048	0.5215	0.4744
1962	283.076	4701.315	13.33372	-0.0439	-0.2626	-0.0909	0.4663	0.2008	-0.0839
1963	284.0987	4701.296	13.31463	-1.7502	-1.2978	1.7408	0.5882	-0.1858	0.7179
1964	285.1215	4701.277	13.29555	1.2936	1.4412	-1.1089	-0.6481	-0.0324	-0.5626
1965	286.1442	4701.258	13.27647	1.073	1.1062	-0.9195	-0.8744	-0.1351	0.7279
1966	287.1669	4701.238	13.25738	-0.2576	-0.4622	0.3178	0.1007	-0.0024	-0.0901
1967	288.1896	4701.219	13.2383	-1.0918	-1.0496	1.4621	-0.8919	0.229	0.5598
1968	289.2124	4701.2	13.21922	0.6386	0.5089	-0.6259	-0.4043	0.3401	-0.0997
1969	290.2351	4701.181	13.20013	0.9592	0.9417	-0.7931	-0.3347	0.1115	0.1897
1970	291.2578	4701.162	13.18105	1.3729	1.5668	-1.213	-0.5784	-0.4226	-0.2509
1971	292.2805	4701.143	13.16197	0.1009	-0.116	0.1283	-0.2824	-0.3892	0.1339
1972	293.3032	4701.124	13.14289	0.4284	0.2495	-0.3919	0.536	-0.1808	0.1126

1973	294.3259	4701.105	13.12381	-0.6575	-0.7818	0.8119	-0.5088	-0.1859	-0.3021
1974	295.3486	4701.086	13.10472	-0.4644	-0.6362	0.6001	-0.3347	-0.0216	-0.0666
1975	296.3713	4701.067	13.08564	-1.9122	-1.3298	2.3241	-0.8396	0.59	0.7197
1976	297.394	4701.048	13.06656	-1.2538	-1.1283	0.5704	-0.8222	1.1056	0.0393
1977	298.4167	4701.029	13.04748	-2.1363	-1.355	0.5964	-0.8222	1.2293	-0.5774
1978	299.4394	4701.01	13.0284	-0.6747	-0.794	-0.2916	-0.7177	1.2199	0.0976
1979	300.4621	4700.99	13.00932	1.1385	1.2034	-1.0532	-0.3695	0.5156	-0.3704
1980	301.4848	4700.971	12.99024	1.2488	1.3714	-1.1387	0.0136	0.4748	0.0289
1981	302.5075	4700.952	12.97115	0.6834	0.5667	-0.5293	-0.1257	0.237	-0.2339
1982	303.5301	4700.933	12.95207	0.5008	0.3366	-0.4773	0.0658	0.5412	-0.0059
1983	304.5528	4700.914	12.93299	-0.0853	-0.3028	-0.0315	1.215	0.5429	0.1369
1984	305.5755	4700.895	12.91391	-0.9022	-0.9429	0.5964	2.1205	0.4245	0.5195
1985	306.5981	4700.876	12.89483	-0.8815	-0.9303	0.4069	2.3817	0.2833	0.0474
1986	307.6208	4700.857	12.87575	-0.6506	-0.7769	0.4069	2.3294	0.5286	-0.2621
1987	308.6435	4700.838	12.85667	-1.8433	-1.3176	1.6776	0.2399	0.4793	-0.53
1988	309.6661	4700.819	12.83759	-1.8364	-1.3162	1.9154	-0.5088	-0.1869	-0.369
1989	310.6888	4700.8	12.81851	0.0526	-0.1659	-1.1572	4.802	-0.9739	-0.0348
1990	259.5712	4702.777	14.79551	0.5731	0.426	-0.3101	-0.8919	-0.9292	0.1146
1991	260.594	4702.758	14.77642	0.6421	0.5133	-0.351	-0.7003	-0.4887	0.3903
1992	261.6168	4702.738	14.75732	0.3594	0.1686	0.054	-0.8919	-0.4081	0.2781
1993	262.6396	4702.719	14.73823	-0.2507	-0.456	0.6484	-0.5958	-0.1901	0.3929
1994	263.6624	4702.7	14.71914	-0.2507	-0.456	0.3995	-0.3172	0.2034	-0.0934
1995	264.6852	4702.681	14.70005	0.4284	0.2495	-0.5442	0.4141	0.2085	-0.4471
1996	265.708	4702.662	14.68096	0.0768	-0.1411	0.0763	-0.0561	-0.2625	0.3661
1997	266.7308	4702.643	14.66187	0.7869	0.7034	-0.4959	-0.5958	-0.4583	0.1705
1998	267.7536	4702.624	14.64278	-1.471	-1.2158	1.7631	-0.0909	-0.8653	0.5252
1999	268.7764	4702.605	14.62369	-1.4124	-1.1942	1.633	-0.2476	-0.6998	0.8399
2000	269.7992	4702.586	14.6046	-0.0094	-0.2285	-0.0055	1.0931	-0.2668	0.482
2001	270.8219	4702.567	14.58551	0.2698	0.0666	-0.3621	1.0583	-0.1672	-0.2046
2002	271.8447	4702.548	14.56643	-1.1401	-1.0742	1.3692	-0.4391	-0.4297	-0.3531
2003	272.8675	4702.528	14.54734	0.3008	0.1015	-0.0612	-0.265	-0.6014	0.4882

2004	273.8903	4702.509	14.52825	0.1181	-0.0979	-0.2581	1.72	-0.1594	0.3506
2005	274.913	4702.49	14.50916	-0.3817	-0.5689	-0.1058	-0.5958	0.6369	-0.4079
2006	275.9358	4702.471	14.49007	-1.6399	-1.2695	-0.247	-0.8919	0.5848	-0.5122
2007	276.9586	4702.452	14.47098	-1.0401	-1.022	0.7934	0.8494	-0.3513	-0.1178
2008	277.9813	4702.433	14.45189	-0.0267	-0.2456	0.2806	-0.1605	-0.3231	0.0423
2009	279.0041	4702.414	14.43281	-1.8501	-1.3189	2.2052	-0.7526	-0.3094	0.3916
2010	280.0268	4702.395	14.41372	0.7627	0.6711	-0.7931	-0.4391	0.5093	0.2204
2011	281.0496	4702.376	14.39463	0.4215	0.2413	-0.6297	1.1976	0.6973	-0.3089
2012	282.0723	4702.357	14.37554	-1.6054	-1.2595	1.685	-0.5436	0.6187	0.3398
2013	283.0951	4702.338	14.35646	-1.7778	-1.3041	2.012	-0.7003	0.8969	-0.2016
2014	284.1178	4702.318	14.33737	-1.34	-1.1655	1.2355	0.6927	0.4562	0.0411
2015	285.1405	4702.299	14.31828	1.3798	1.5779	-1.3244	-0.6307	0.2525	-0.1882
2016	286.1633	4702.28	14.2992	0.8799	0.8305	-0.7448	-0.5784	-0.167	0.475
2017	287.186	4702.261	14.28011	-1.471	-1.2158	1.8337	-0.4043	0.1898	0.2401
2018	288.2087	4702.242	14.26102	-0.3231	-0.5193	0.3921	-0.6133	-0.0531	-0.1953
2019	289.2315	4702.223	14.24194	0.0285	-0.1904	-0.0946	0.7971	0.0959	0.1684
2020	290.2542	4702.204	14.22285	-0.8643	-0.9196	1.0163	-0.0735	-0.2048	0.3418
2021	291.2769	4702.185	14.20377	-0.723	-0.8275	1.0014	-0.4391	-0.2765	0.1495
2022	292.2996	4702.166	14.18468	-1.24	-1.122	1.6776	-0.7526	-0.2726	0.8306
2023	293.3223	4702.147	14.16559	-1.0297	-1.0164	1.4101	-0.561	-0.196	0.3622
2024	294.345	4702.128	14.14651	-0.5023	-0.6661	0.8379	-0.8919	0.1094	0.06
2025	295.3677	4702.109	14.12742	-0.8505	-0.911	1.2986	-0.8744	0.5246	0.6896
2026	296.3904	4702.089	14.10834	-0.2266	-0.4344	-0.5628	-0.1605	1.0371	-0.2062
2027	297.4131	4702.07	14.08925	-2.0535	-1.3482	1.1389	-0.2128	1.3522	-0.5515
2028	298.4358	4702.051	14.07017	0.156	-0.0577	-0.1318	-0.3521	1.1267	-0.1129
2029	299.4585	4702.032	14.05108	0.6283	0.4957	-0.2693	-0.7874	0.8091	0.6527
2030	300.4812	4702.013	14.032	0.6007	0.4607	-0.7411	0.6404	0.2615	-0.5644
2031	301.5039	4701.994	14.01292	-0.1128	-0.3291	0.2658	0.031	0.2846	0.5258
2032	302.5265	4701.975	13.99383	-0.0198	-0.2388	0.3884	-0.8919	0.3086	-0.0868
2033	303.5492	4701.956	13.97475	0.6214	0.4869	-0.4996	-0.5262	0.4623	-0.1683
2034	304.5719	4701.937	13.95566	-0.6471	-0.7744	0.6076	0.2051	0.3761	-0.174

2035	305.5946	4701.918	13.93658	-1.4055	-1.1916	1.4287	0.4837	0.5384	0.5922
2036	306.6172	4701.899	13.9175	-0.6954	-0.8085	0.6336	1.1454	0.5711	0.1492
2037	307.6399	4701.88	13.89841	-0.3955	-0.5803	0.2137	1.6678	0.5916	0.1406
2038	308.6625	4701.86	13.87933	-0.9332	-0.9614	0.4069	2.4165	0.5381	-0.0727
2039	309.6852	4701.841	13.86025	-0.8712	-0.9239	0.6224	1.2847	-0.1193	-0.5342
2040	310.7078	4701.822	13.84116	-0.6919	-0.8061	0.5073	0.7449	-0.6699	-0.2936
2041	259.5902	4703.799	15.81832	1.3005	1.452	-1.0495	-0.8919	-0.8726	-0.5325
2042	260.6131	4703.78	15.79923	1.2453	1.3661	-1.1795	-0.8919	-0.4022	0.4869
2043	261.6359	4703.761	15.78013	0.4801	0.3115	-0.2916	-0.6481	-0.2544	0.146
2044	262.6587	4703.742	15.76104	-0.6127	-0.7495	1.0051	-0.8048	-0.093	0.3597
2045	263.6815	4703.723	15.74195	1.5245	1.8148	-1.3542	-0.4914	0.1607	-0.0855
2046	264.7043	4703.704	15.72285	0.449	0.2741	-0.5776	0.5708	0.1072	-0.3907
2047	265.7271	4703.685	15.70376	-0.9367	-0.9634	0.6336	0.4141	-0.1499	-0.6601
2048	266.7499	4703.666	15.68467	0.6386	0.5089	-0.9417	1.3892	-0.3748	-0.087
2049	267.7727	4703.647	15.66557	1.2315	1.3448	-1.1535	0.2922	-0.5476	0.041
2050	268.7955	4703.628	15.64648	0.8317	0.7641	-0.9046	-0.3172	-0.7928	0.187
2051	269.8183	4703.609	15.62739	-0.3265	-0.5223	0.0391	1.5459	-0.6251	-0.1536
2052	270.841	4703.589	15.6083	-1.3159	-1.1554	1.607	-0.6307	0.076	-0.4451
2053	271.8638	4703.57	15.5892	-0.5299	-0.6875	0.1952	1.9986	0.2999	-0.0194
2054	272.8866	4703.551	15.57011	0.0457	-0.1729	-0.3436	2.4687	0.1688	0.8929
2055	273.9094	4703.532	15.55102	-0.4196	-0.6001	0.184	1.511	0.8452	-0.1226
2056	274.9321	4703.513	15.53193	-1.9811	-1.3399	1.7705	-0.3869	1.0117	-0.3604
2057	275.9549	4703.494	15.51283	-2.2672	-1.3595	0.9977	-0.6655	0.8947	-0.5283
2058	276.9777	4703.475	15.49374	-1.0849	-1.046	0.537	1.8593	-0.2522	-0.3251
2059	278.0004	4703.456	15.47465	-1.3607	-1.1739	1.4918	0.3967	-0.2067	0.0094
2060	279.0232	4703.437	15.45556	-1.8777	-1.3239	2.2201	-0.8744	0.0851	0.7246
2061	280.0459	4703.418	15.43647	-0.6885	-0.8037	-0.1504	3.0781	0.4265	-0.6397
2062	281.0687	4703.398	15.41738	-0.0198	-0.2388	0.1357	0.2051	0.7788	0.6219
2063	282.0914	4703.379	15.39829	-1.1263	-1.0673	0.7413	2.3294	0.8864	-0.3663
2064	283.1142	4703.36	15.3792	-1.6743	-1.2789	1.7185	-0.474	0.9716	0.1886
2065	284.1369	4703.341	15.36011	-1.0332	-1.0183	0.0317	3.0433	0.6219	-0.6695

2066	285.1596	4703.322	15.34102	0.5559	0.4045	-0.3882	-0.5784	0.2371	0.3572
2067	286.1824	4703.303	15.32193	0.8937	0.8497	-0.9343	-0.1257	-0.2231	0.3795
2068	287.2051	4703.284	15.30284	0.7662	0.6757	-0.8712	0.8668	-0.0831	-0.5509
2069	288.2278	4703.265	15.28375	-0.3334	-0.5282	0.1654	-0.4565	-0.1348	-0.6291
2070	289.2505	4703.246	15.26466	-0.5713	-0.7188	0.5816	0.5534	0.0556	0.6747
2071	290.2733	4703.227	15.24557	-1.2435	-1.1236	1.1723	0.2922	-0.005	-0.3161
2072	291.296	4703.208	15.22648	-1.3779	-1.1808	1.6293	-0.7003	0.3008	0.3849
2073	292.3187	4703.189	15.20739	-0.1439	-0.3584	0.3735	-0.6133	0.2574	-0.2547
2074	293.3414	4703.169	15.1883	-0.7299	-0.8322	1.0163	-0.5088	0.2964	-0.1404
2075	294.3641	4703.15	15.16921	-0.4265	-0.6057	0.511	-0.265	0.592	-0.6264
2076	295.3868	4703.131	15.15012	0.8524	0.7925	-0.5665	-0.7526	1.0581	0.1044
2077	296.4095	4703.112	15.13103	-1.5399	-1.2392	0.3958	-0.4217	1.4829	-0.5729
2078	297.4322	4703.093	15.11195	-0.1611	-0.3745	0.1729	-0.8919	1.5366	-0.1728
2079	298.4549	4703.074	15.09286	0.063	-0.1553	0.2546	-0.7526	1.0131	0.2659
2080	299.4776	4703.055	15.07377	0.5111	0.3492	-0.2581	-0.5958	0.5124	-0.0421
2081	300.5003	4703.036	15.05468	-0.5575	-0.7085	0.9457	-0.8048	0.2851	0.2288
2082	301.5229	4703.017	15.0356	1.0488	1.0708	-0.9417	-0.8919	0.3503	-0.5682
2083	302.5456	4702.998	15.01651	-0.9125	-0.9491	1.1983	-0.8048	0.1597	0.5782
2084	303.5683	4702.979	14.99742	-0.23	-0.4375	0.4552	-0.2302	0.3508	-0.2024
2085	304.591	4702.959	14.97833	-0.0715	-0.2895	0.2509	-0.1954	0.7319	0.3123
2086	305.6136	4702.94	14.95925	-1.3641	-1.1753	1.555	0.0658	0.6609	0.2286
2087	306.6363	4702.921	14.94016	-1.7123	-1.2887	1.8337	0.1703	0.7167	0.2679
2088	307.659	4702.902	14.92107	-1.8398	-1.3169	1.6962	0.7449	0.525	-0.0893
2089	308.6816	4702.883	14.90199	-0.3231	-0.5193	0.0057	2.1205	0.3972	0.191
2090	309.7043	4702.864	14.8829	-1.3262	-1.1597	0.9717	2.016	-0.4703	-0.2531
2091	310.7269	4702.845	14.86381	-0.7436	-0.8415	0.8119	-0.2998	-0.9056	-0.501
2092	259.6093	4704.822	16.84114	0.2388	0.0322	-0.0909	-0.3172	-0.8739	-0.1315
2093	260.6322	4704.803	16.82204	1.2488	1.3714	-1.0012	-0.8919	-0.1041	0.6156
2094	261.655	4704.784	16.80295	-0.7747	-0.8622	1.176	-0.561	0.2856	-0.003
2095	262.6778	4704.765	16.78385	1.4039	1.6167	-1.2353	-0.5262	0.0929	-0.3544
2096	263.7006	4704.746	16.76475	1.3866	1.5889	-1.4359	0.7971	-0.1653	0.4691

2097	264.7234	4704.727	16.74565	1.2763	1.4143	-1.4359	1.2673	-0.3983	0.3539
2098	265.7462	4704.708	16.72656	1.0316	1.0457	-1.1164	0.7275	-0.3037	0.4485
2099	266.769	4704.689	16.70746	-0.4162	-0.5973	0.028	1.9289	-0.4162	-0.1716
2100	267.7918	4704.669	16.68836	-0.4265	-0.6057	-0.1244	-0.4914	-0.747	-0.7198
2101	268.8146	4704.65	16.66927	-0.0542	-0.2727	-0.4365	0.0832	-0.9455	-0.5189
2102	269.8373	4704.631	16.65017	-0.2714	-0.4743	0.1729	0.1877	-0.7282	-0.2714
2103	270.8601	4704.612	16.63108	-1.9811	-1.3399	1.8634	-0.0561	0.2276	-0.4823
2104	271.8829	4704.593	16.61198	-1.4089	-1.1929	-0.5368	1.2673	0.7659	-0.4557
2105	272.9057	4704.574	16.59288	-0.9194	-0.9532	0.1543	2.7647	1.2988	0.1692
2106	273.9285	4704.555	16.57379	-1.633	-1.2675	1.2764	0.5185	1.4722	-0.17
2107	274.9512	4704.536	16.55469	-1.309	-1.1525	0.9828	0.7275	1.2947	-0.0454
2108	275.974	4704.517	16.5356	-2.0225	-1.3449	2.2498	-0.7351	0.7097	-0.0618
2109	276.9968	4704.498	16.5165	-0.6506	-0.7769	0.7302	-0.1257	0.0934	0.0626
2110	278.0195	4704.479	16.49741	-0.5368	-0.6927	0.8045	-0.0909	0.0055	-0.0241
2111	279.0423	4704.459	16.47831	-1.7984	-1.3085	1.9971	0.2922	0.4565	0.4559
2112	280.065	4704.44	16.45922	0.2629	0.0589	-0.5814	1.8245	0.627	-0.5539
2113	281.0878	4704.421	16.44013	-1.0746	-1.0405	0.8788	2.0508	0.7111	0.6967
2114	282.1105	4704.402	16.42103	-1.2366	-1.1205	0.8454	2.2772	0.3517	-0.4391
2115	283.1333	4704.383	16.40194	-1.1987	-1.1028	1.0126	1.4762	0.1892	0.0585
2116	284.156	4704.364	16.38284	-1.8812	-1.3245	1.7742	1.5633	-0.0792	0.3978
2117	285.1787	4704.345	16.36375	-1.1297	-1.069	1.3469	-0.4391	-0.18	0.3597
2118	286.2015	4704.326	16.34466	1.204	1.3025	-1.0309	-0.3347	-0.081	0.2108
2119	287.2242	4704.307	16.32556	1.4246	1.6502	-1.4322	-0.0212	-0.232	0.518
2120	288.2469	4704.288	16.30647	0.2181	0.0094	-0.2433	0.5185	-0.0878	0.1023
2121	289.2696	4704.268	16.28738	-0.2335	-0.4406	0.2843	-0.1257	-0.0927	-0.3089
2122	290.2924	4704.249	16.26828	0.0802	-0.1375	-0.3956	2.0334	0.4284	-0.4501
2123	291.3151	4704.23	16.24919	-1.4985	-1.2254	1.7668	-0.7351	0.6328	0.5547
2124	292.3378	4704.211	16.2301	-0.6161	-0.752	0.7116	-0.3521	0.4745	-0.2688
2125	293.3605	4704.192	16.21101	0.032	-0.1869	0.0205	0.2748	0.2364	-0.1358
2126	294.3832	4704.173	16.19192	-1.6089	-1.2606	2.1197	-0.8048	0.8852	0.7197
2127	295.4059	4704.154	16.17282	-1.4055	-1.1916	0.9345	-0.7874	1.4646	-0.1617

2128	296.4286	4704.135	16.15373	-1.5778	-1.2512	1.2838	-0.8919	1.689	-0.474
2129	297.4513	4704.116	16.13464	-0.6816	-0.7989	1.0683	-0.8919	1.2116	0.1673
2130	298.474	4704.097	16.11555	-0.2507	-0.456	0.5221	-0.6481	0.8033	0.4673
2131	299.4967	4704.078	16.09646	0.7938	0.7127	-0.5516	-0.7526	0.5053	-0.1542
2132	300.5194	4704.058	16.07737	-1.3745	-1.1794	1.7705	-0.8919	0.6672	0.4983
2133	301.542	4704.039	16.05828	0.5387	0.3831	-0.403	0.031	0.2511	-0.2681
2134	302.5647	4704.02	16.03918	0.0388	-0.1799	0.0391	-0.2824	0.2204	-0.5246
2135	303.5874	4704.001	16.02009	0.4284	0.2495	-0.2135	-0.6307	0.2036	0.3918
2136	304.6101	4703.982	16.001	-0.3403	-0.534	0.5444	-0.4565	0.416	0.2838
2137	305.6327	4703.963	15.98191	-1.0401	-1.022	0.9457	1.215	0.57	0.2301
2138	306.6554	4703.944	15.96282	-1.6812	-1.2807	1.7779	0.4489	0.8197	0.8108
2139	307.6781	4703.925	15.94373	-1.5227	-1.2335	1.2355	1.7896	0.5625	0.178
2140	308.7007	4703.906	15.92464	-0.6195	-0.7545	0.7822	-0.0387	0.1927	0.4779
2141	309.7234	4703.887	15.90555	-0.1714	-0.3841	0.3215	-0.6655	-0.7448	-0.3182
2142	310.746	4703.868	15.88646	-0.4817	-0.6499	0.0614	1.1976	-1.2759	-0.2842
2143	259.6284	4705.845	17.86396	0.1526	-0.0614	0.054	-0.6133	-0.8467	-0.0279
2144	260.6513	4705.826	17.84486	0.4456	0.27	-0.2284	-0.6133	-0.1232	0.3414
2145	261.6741	4705.807	17.82576	1.3729	1.5668	-1.0904	-0.8919	0.2235	-0.0607
2146	262.6969	4705.788	17.80665	0.7593	0.6665	-0.6668	-0.2302	0	-0.0243
2147	263.7197	4705.769	17.78755	-0.2817	-0.4834	-0.1578	1.511	-0.1724	-0.5774
2148	264.7425	4705.75	17.76845	0.2526	0.0474	-1.3913	3.3742	-0.2167	0.3195
2149	265.7653	4705.73	17.74935	0.0457	-0.1729	-1.2613	5.2373	-0.223	0.0935
2150	266.7881	4705.711	17.73025	-0.5506	-0.7032	-0.0798	0.0484	-0.6002	-0.6294
2151	267.8109	4705.692	17.71115	1.1143	1.1674	-0.99	-0.3347	-0.7736	0.2029
2152	268.8337	4705.673	17.69205	0.742	0.6436	-0.481	-0.4565	-0.9885	0.1019
2153	269.8564	4705.654	17.67295	1.4521	1.6952	-1.2984	-0.1605	-0.8597	0.7812
2154	270.8792	4705.635	17.65386	-0.1645	-0.3777	0.4181	-0.2476	0.0988	-0.0363
2155	271.902	4705.616	17.63476	-1.0677	-1.0369	0.4404	1.3892	0.66	-0.0853
2156	272.9248	4705.597	17.61566	-1.5537	-1.2436	1.5216	1.2499	1.2893	-0.5298
2157	273.9476	4705.578	17.59656	-1.0608	-1.0332	1.0906	0.0136	0.821	-0.2223
2158	274.9703	4705.559	17.57746	0.0147	-0.2044	-0.2172	1.9638	0.8516	-0.4642

2159	275.9931	4705.539	17.55836	-0.7299	-0.8322	0.693	-0.3521	-0.0758	-0.2395
2160	277.0158	4705.52	17.53926	0.2664	0.0628	-0.2172	0.6753	-0.2373	0.0741
2161	278.0386	4705.501	17.52017	-1.2986	-1.148	1.425	-0.1605	-0.1073	0.5123
2162	279.0614	4705.482	17.50107	-1.5296	-1.2358	1.8114	-0.4043	0.3386	0.5974
2163	280.0841	4705.463	17.48197	-1.0263	-1.0145	0.7896	1.511	0.7822	-0.5164
2164	281.1069	4705.444	17.46287	-0.947	-0.9695	-0.1541	5.0631	0.8159	0.1462
2165	282.1296	4705.425	17.44377	-0.4955	-0.6607	-0.4625	4.2622	0.2269	-0.5595
2166	283.1523	4705.406	17.42468	1.0419	1.0608	-1.239	1.3892	-0.1092	-0.1375
2167	284.1751	4705.387	17.40558	0.4353	0.2577	-0.6074	1.8245	-0.167	-0.5127
2168	285.1978	4705.368	17.38648	0.0837	-0.1339	0.0131	0.031	-0.1153	-0.2702
2169	286.2206	4705.349	17.36739	0.5559	0.4045	-0.4699	0.2574	0.1715	0.3025
2170	287.2433	4705.329	17.34829	0.2526	0.0474	-0.3956	0.6056	-0.0804	-0.0493
2171	288.266	4705.31	17.32919	0.5042	0.3408	-0.2693	-0.7351	0.1182	0.7078
2172	289.2887	4705.291	17.3101	-0.7781	-0.8645	0.3512	-0.5262	-0.1353	-0.6
2173	290.3114	4705.272	17.291	-1.5261	-1.2347	1.4361	0.8842	0.0541	0.1235
2174	291.3342	4705.253	17.27191	-1.3365	-1.1641	1.6925	-0.77	0.1781	0.6317
2175	292.3569	4705.234	17.25281	0.8524	0.7925	-0.7151	-0.2128	0.1741	-0.1392
2176	293.3796	4705.215	17.23371	0.4353	0.2577	-0.2507	-0.0387	0.1441	0.5965
2177	294.4023	4705.196	17.21462	0.2146	0.0056	-0.1244	-0.77	0.4953	0.0039
2178	295.425	4705.177	17.19552	-0.8264	-0.8958	-1.1201	-0.6481	1.1758	-0.4036
2179	296.4477	4705.158	17.17643	-0.916	-0.9512	0.8417	-0.7177	1.4787	-0.2582
2180	297.4704	4705.138	17.15733	-0.6333	-0.7645	0.916	-0.5784	0.5902	0.0077
2181	298.4931	4705.119	17.13824	0.4318	0.2536	-0.1912	-0.8919	0.4428	-0.4511
2182	299.5158	4705.1	17.11914	-0.1749	-0.3873	0.4255	-0.7351	0.3443	0.3101
2183	300.5384	4705.081	17.10005	-1.2848	-1.1421	1.6962	-0.8919	0.5563	0.7711
2184	301.5611	4705.062	17.08095	-0.5816	-0.7266	0.9791	-0.7351	0.1916	0.0243
2185	302.5838	4705.043	17.06186	0.7248	0.6208	-0.5145	-0.2128	-0.0144	0.1487
2186	303.6065	4705.024	17.04277	-0.4541	-0.628	0.6113	-0.7874	-0.1427	-0.6057
2187	304.6291	4705.005	17.02367	-0.4369	-0.6141	0.3847	0.7275	0.0387	-0.601
2188	305.6518	4704.986	17.00458	-0.7953	-0.8758	0.4664	2.3817	0.1874	-0.5208
2189	306.6745	4704.967	16.98549	-0.0956	-0.3127	-0.0649	1.2324	0.3631	-0.2251

2190	307.6971	4704.948	16.96639	-1.6709	-1.278	1.7259	0.327	0.1504	0.7338
2191	308.7198	4704.928	16.9473	0.4146	0.2331	-0.6631	1.6503	-0.2078	-0.4748
2192	309.7425	4704.909	16.92821	0.325	0.129	-0.0389	-0.6829	-0.9485	0.3089
2193	310.7651	4704.89	16.90911	0.4008	0.2169	-0.5219	0.5882	-1.3665	0.0703
2194	259.6475	4706.868	18.88677	-0.43	-0.6085	0.7042	-0.8919	-0.8272	0.3569
2195	260.6704	4706.849	18.86767	-0.5954	-0.7368	0.8602	-0.8919	-0.0572	-0.2418
2196	261.6932	4706.83	18.84857	-0.4541	-0.628	0.7673	-0.8919	-0.0702	0.6716
2197	262.716	4706.811	18.82946	-0.0129	-0.2319	0.2472	-0.7003	-0.4013	0.324
2198	263.7388	4706.791	18.81036	-0.5472	-0.7006	0.0614	2.6777	-0.2102	0.5125
2199	264.7616	4706.772	18.79125	-0.9884	-0.9933	-0.8154	5.8119	-0.0598	-0.0753
2200	265.7844	4706.753	18.77215	-0.9125	-0.9491	-0.5739	4.1403	-0.4962	-0.6278
2201	266.8072	4706.734	18.75305	0.7386	0.639	-0.756	0.5011	-0.994	0.2227
2202	267.83	4706.715	18.73394	0.9213	0.8882	-0.8563	0.4489	-0.971	-0.0143
2203	268.8528	4706.696	18.71484	0.0974	-0.1196	0.0614	0.3967	-0.9792	0.6871
2204	269.8755	4706.677	18.69574	1.5452	1.8494	-1.291	-0.6133	-0.9877	-0.0897
2205	270.8983	4706.658	18.67664	0.2319	0.0246	-0.912	2.3991	-0.9031	-0.6127
2206	271.9211	4706.639	18.65753	-0.1266	-0.3422	0.3289	-0.0561	-0.5823	0.0174
2207	272.9439	4706.62	18.63843	0.6421	0.5133	-0.3027	-0.7351	-0.2854	-0.0097
2208	273.9667	4706.6	18.61933	-1.0366	-1.0202	0.9903	0.7623	-0.5923	-0.1134
2209	274.9894	4706.581	18.60023	-0.1507	-0.3649	0.4441	-0.2476	-0.5096	-0.1087
2210	276.0122	4706.562	18.58112	-1.2573	-1.1298	1.451	-0.1431	-0.7557	0.0429
2211	277.0349	4706.543	18.56202	-0.2473	-0.453	0.3066	-0.561	-0.5327	0.0021
2212	278.0577	4706.524	18.54292	-1.0608	-1.0332	1.3915	-0.2128	-0.0411	0.2962
2213	279.0805	4706.505	18.52382	-1.8157	-1.3121	1.934	0.5708	0.3367	0.4609
2214	280.1032	4706.486	18.50472	-0.5678	-0.7163	0.0986	2.521	0.7614	-0.255
2215	281.126	4706.467	18.48562	-1.6502	-1.2724	1.3284	1.9463	0.757	-0.4999
2216	282.1487	4706.448	18.46652	0.7765	0.6895	-0.834	1.0583	0.3635	-0.0294
2217	283.1714	4706.429	18.44742	0.3491	0.1567	-0.808	2.9214	-0.175	0.6826
2218	284.1942	4706.409	18.42832	-0.2335	-0.4406	0.0577	1.215	-0.0781	0.0551
2219	285.2169	4706.39	18.40922	0.518	0.3577	-0.4587	-0.6307	0.255	0.0904
2220	286.2397	4706.371	18.39012	0.9937	0.991	-1.0161	0.031	0.3891	0.7989

2221	287.2624	4706.352	18.37102	0.2526	0.0474	-0.2321	0.2748	0.2888	-0.5409
2222	288.2851	4706.333	18.35192	-0.8884	-0.9345	0.8974	0.1007	0.6556	0.2914
2223	289.3078	4706.314	18.33282	-2.0742	-1.3502	2.2312	-0.8919	0.2385	-0.6161
2224	290.3305	4706.295	18.31372	-1.0091	-1.005	1.3469	-0.1431	0.043	0.5011
2225	291.3533	4706.276	18.29462	1.1971	1.292	-0.886	-0.7526	-0.2559	-0.033
2226	292.376	4706.257	18.27552	1.5383	1.8379	-1.3542	-0.5262	0.0035	-0.3618
2227	293.3987	4706.238	18.25642	0.3077	0.1094	-0.0352	-0.7351	0.3645	0.2419
2228	294.4214	4706.218	18.23732	-0.685	-0.8013	-0.0092	-0.4217	0.9482	-0.2755
2229	295.4441	4706.199	18.21822	-1.4985	-1.2254	0.5556	-0.8919	1.0641	-0.5262
2230	296.4668	4706.18	18.19912	0.6007	0.4607	-0.5405	-0.8919	1.1321	0.2508
2231	297.4895	4706.161	18.18003	-1.3365	-1.1641	1.7854	-0.6655	0.6976	0.5451
2232	298.5122	4706.142	18.16093	0.6766	0.5577	-0.4922	-0.7003	0.2072	-0.1391
2233	299.5349	4706.123	18.14183	0.1733	-0.0393	0.0057	-0.6655	0.0591	-0.5734
2234	300.5575	4706.104	18.12273	0.1974	-0.0132	-0.1281	-0.0212	0.1222	-0.4547
2235	301.5802	4706.085	18.10363	0.1526	-0.0614	0.1506	-0.857	0.0397	-0.0104
2236	302.6029	4706.066	18.08454	-0.3851	-0.5717	0.7711	-0.7874	-0.217	0.378
2237	303.6256	4706.047	18.06544	1.1626	1.2397	-1.2464	0.6578	-0.3428	-0.337
2238	304.6482	4706.027	18.04634	-0.7402	-0.8392	0.916	0.4663	-0.4908	0.5578
2239	305.6709	4706.008	18.02725	0.1905	-0.0206	-0.3696	1.3195	-0.2753	0.1513
2240	306.6936	4705.989	18.00815	0.7558	0.6619	-0.9603	1.0409	-0.1733	-0.6505
2241	307.7162	4705.97	17.98905	0.2664	0.0628	-0.2841	0.327	0.0637	0.19
2242	308.7389	4705.951	17.96995	0.0457	-0.1729	0.0986	-0.1605	-0.2088	-0.0959
2243	309.7616	4705.932	17.95086	0.4732	0.3031	-0.195	-0.4914	-0.8751	-0.4078
2244	310.7842	4705.913	17.93176	1.266	1.3982	-1.0606	-0.3521	-1.3576	0.4922
2245	259.6667	4707.891	19.90959	0.3146	0.1172	-0.2544	-0.0212	-0.8271	-0.4759
2246	260.6895	4707.872	19.89048	0.5731	0.426	-0.3436	-0.8919	-0.0582	0.0598
2247	261.7123	4707.852	19.87138	-0.1887	-0.4	0.2323	0.327	-0.4339	0.3545
2248	262.7351	4707.833	19.85227	0.2457	0.0398	0.1654	-0.8919	-0.7423	0.0759
2249	263.7579	4707.814	19.83316	0.1181	-0.0979	-1.187	0.1181	-0.7212	-0.6648
2250	264.7807	4707.795	19.81405	0.1319	-0.0834	-1.2984	-0.0038	-0.2802	-0.4287
2251	265.8035	4707.776	19.79495	1.5831	1.9133	-1.421	-0.7177	-0.5659	0.1067

2252	266.8263	4707.757	19.77584	1.5866	1.9192	-1.4359	-0.8919	-0.887	0.2276
2253	267.8491	4707.738	19.75673	0.356	0.1646	-0.4327	0.6578	-0.9551	0.046
2254	268.8719	4707.719	19.73763	-0.7885	-0.8713	0.4552	1.7896	-0.6577	-0.3324
2255	269.8947	4707.7	19.71852	0.0251	-0.1939	-0.1355	1.1802	-0.7482	-0.3548
2256	270.9174	4707.681	19.69941	1.4384	1.6727	-1.2501	-0.7351	-1.2688	0.1915
2257	271.9402	4707.661	19.68031	1.297	1.4466	-0.9603	-0.8919	-1.5573	0.3035
2258	272.963	4707.642	19.6612	1.6865	2.0908	-1.4173	-0.8919	-1.3958	0.1283
2259	273.9858	4707.623	19.6421	0.3043	0.1054	-0.2358	0.2225	-0.85	0.1546
2260	275.0085	4707.604	19.62299	1.1488	1.2189	-1.1164	-0.1779	-0.8196	-0.2661
2261	276.0313	4707.585	19.60389	0.0526	-0.1659	-0.3361	1.0757	-0.8129	-0.2862
2262	277.0541	4707.566	19.58478	-1.957	-1.3366	2.2572	-0.8919	-0.6229	-0.1037
2263	278.0768	4707.547	19.56568	-0.4093	-0.5917	0.7896	-0.561	-0.0994	0.5155
2264	279.0996	4707.528	19.54657	0.449	0.2741	-0.6742	1.2324	0.2463	0.0465
2265	280.1223	4707.509	19.52747	0.6007	0.4607	-0.5888	0.2922	0.5179	-0.4633
2266	281.1451	4707.489	19.50836	-1.4537	-1.2096	0.9754	3.0781	0.4599	0.1908
2267	282.1678	4707.47	19.48926	-1.1332	-1.0708	1.0943	1.4936	0.2567	0.0361
2268	283.1905	4707.451	19.47016	0.6869	0.5712	-0.938	1.4762	0.1127	-0.239
2269	284.2133	4707.432	19.45105	0.5387	0.3831	-0.7374	0.9364	0.5168	-0.0631
2270	285.236	4707.413	19.43195	1.4728	1.7291	-1.3765	-0.2824	0.7269	0.6145
2271	286.2588	4707.394	19.41285	0.9075	0.8689	-0.6817	-0.4217	0.652	-0.023
2272	287.2815	4707.375	19.39374	-0.9194	-0.9532	1.2095	-0.6307	0.7022	-0.1148
2273	288.3042	4707.356	19.37464	-0.9505	-0.9715	0.563	-0.3521	0.9564	-0.1903
2274	289.3269	4707.337	19.35554	-2.0949	-1.352	0.2732	0.1529	0.5092	-0.5724
2275	290.3496	4707.318	19.33643	-1.5916	-1.2554	1.8708	-0.7351	-0.1801	0.5069
2276	291.3724	4707.298	19.31733	-0.1059	-0.3226	0.1097	-0.2128	-0.4758	-0.1367
2277	292.3951	4707.279	19.29823	1.3453	1.5228	-1.3802	0.1529	0.6973	0.0084
2278	293.4178	4707.26	19.27913	-0.3576	-0.5486	-0.1206	0.2225	1.7416	-0.0379
2279	294.4405	4707.241	19.26002	-1.5882	-1.2544	1.1277	-0.5958	2.5582	-0.5307
2280	295.4632	4707.222	19.24092	0.2215	0.0132	-0.247	-0.8919	2.1093	-0.1391
2281	296.4859	4707.203	19.22182	1.4315	1.6614	-1.1684	-0.7003	1.2544	-0.0733
2282	297.5086	4707.184	19.20272	-0.0784	-0.2961	0.4255	-0.8048	0.7267	0.1854

2283	298.5313	4707.165	19.18362	-0.6816	-0.7989	1.0832	-0.7177	0.3934	0.2263
2284	299.554	4707.146	19.16452	-0.3541	-0.5457	0.4998	-0.1779	-0.074	0.0803
2285	300.5766	4707.127	19.14541	0.256	0.0513	0.0503	-0.7351	-0.1717	0.1356
2286	301.5993	4707.107	19.12631	0.8351	0.7688	-0.6705	-0.6133	-0.1675	-0.2425
2287	302.622	4707.088	19.10721	-0.0025	-0.2216	0.2658	-0.8222	-0.1623	0.2824
2288	303.6447	4707.069	19.08811	-0.4679	-0.639	0.7636	-0.2824	-0.0926	0.0419
2289	304.6673	4707.05	19.06901	0.5869	0.4433	-0.4476	-0.3869	-0.1787	-0.093
2290	305.69	4707.031	19.04991	-0.2025	-0.4126	0.4552	-0.6655	-0.0443	0.6726
2291	306.7127	4707.012	19.03081	-0.8608	-0.9175	0.7413	1.3717	-0.0557	-0.1013
2292	307.7353	4706.993	19.01171	0.0802	-0.1375	0.1617	-0.8222	0.0657	0.2735
2293	308.758	4706.974	18.99261	0.3146	0.1172	-0.1429	0.0658	-0.2527	-0.0769
2294	309.7806	4706.955	18.97351	0.4318	0.2536	-0.4439	0.327	-0.6523	0.234
2295	310.8033	4706.936	18.95441	1.4418	1.6783	-1.4359	0.536	-1.1865	0.244
2296	259.6858	4708.914	20.93241	0.4111	0.2291	-0.1541	-0.8919	-0.6503	-0.3444
2297	260.7086	4708.894	20.9133	0.1009	-0.116	0.1432	-0.8919	0.0523	0.2301
2298	261.7314	4708.875	20.89419	0.3181	0.1211	-0.1355	-0.7003	-0.4387	0.4508
2299	262.7542	4708.856	20.87507	1.4384	1.6727	-1.343	0.0658	-1.0281	-0.0992
2300	263.777	4708.837	20.85596	0.3525	0.1606	-1.4322	-0.4391	-1.1819	-0.4375
2301	264.7998	4708.818	20.83685	1.2005	1.2973	-1.3096	0.8494	-0.9672	0.6182
2302	265.8226	4708.799	20.81774	1.6176	1.972	-1.4359	-0.2824	-0.9968	0.5194
2303	266.8454	4708.78	20.79863	1.5073	1.7861	-1.4359	-0.8919	-1.2672	-0.4497
2304	267.8682	4708.761	20.77952	1.328	1.4955	-1.4359	-0.0561	-0.9289	-0.1597
2305	268.891	4708.742	20.76041	1.3143	1.4737	-1.4173	0.3096	-0.5042	-0.0613
2306	269.9138	4708.722	20.7413	1.4556	1.7008	-1.3913	0.2225	-0.6665	0.8241
2307	270.9365	4708.703	20.72219	0.5766	0.4303	-0.704	1.1802	-1.1422	0.1839
2308	271.9593	4708.684	20.70309	1.3108	1.4683	-1.4359	1.1976	-1.3767	0.1053
2309	272.9821	4708.665	20.68398	-0.4782	-0.6472	-0.429	4.6627	-0.9671	0.1754
2310	274.0049	4708.646	20.66487	-0.7471	-0.8438	0.9271	0.1703	-0.2214	0.0088
2311	275.0276	4708.627	20.64576	0.4215	0.2413	-0.0575	-0.8919	-0.043	0.3152
2312	276.0504	4708.608	20.62665	0.8248	0.7547	-1.1015	1.1976	-0.2902	-0.6013
2313	277.0732	4708.589	20.60754	0.4904	0.324	-0.2321	-0.7177	-0.1953	-0.0655

2314	278.0959	4708.57	20.58843	-0.4472	-0.6225	0.028	0.8146	0.4735	0.3249
2315	279.1187	4708.55	20.56933	0.1836	-0.0281	-0.3324	0.2399	0.8846	0.1042
2316	280.1414	4708.531	20.55022	0.942	0.9173	-1.2167	1.1628	0.6444	-0.5797
2317	281.1642	4708.512	20.53111	-1.7812	-1.3048	1.1798	4.0881	0.3737	0.1623
2318	282.1869	4708.493	20.512	-1.8984	-1.3275	2.0306	0.3792	0.2118	0.3962
2319	283.2097	4708.474	20.4929	-0.2128	-0.422	0.1171	0.7449	0.0091	0.3603
2320	284.2324	4708.455	20.47379	0.2905	0.0899	-0.5553	1.0931	0.4534	-0.1934
2321	285.2551	4708.436	20.45468	0.1354	-0.0797	-0.1095	-0.1779	0.4918	0.5318
2322	286.2779	4708.417	20.43557	-0.1507	-0.3649	0.1654	0.4141	0.6681	-0.4361
2323	287.3006	4708.398	20.41647	-1.0504	-1.0276	1.2949	-0.4217	1.0206	-0.2182
2324	288.3233	4708.378	20.39736	-0.9918	-0.9953	0.667	0.0136	1.15	0.1926
2325	289.346	4708.359	20.37826	-0.4334	-0.6113	-0.2767	0.5534	0.6964	-0.4006
2326	290.3687	4708.34	20.35915	-1.6812	-1.2807	2.0789	-0.1779	0.0269	0.2653
2327	291.3915	4708.321	20.34004	-0.4127	-0.5945	0.6819	-0.1257	0.0896	0.1014
2328	292.4142	4708.302	20.32094	-0.5023	-0.6661	0.3549	0.4489	1.5159	-0.2285
2329	293.4369	4708.283	20.30183	-2.1431	-1.3554	1.4287	0.536	2.4476	0.0032
2330	294.4596	4708.264	20.28273	-2.0363	-1.3465	-0.6668	5.6552	2.5414	-0.5838
2331	295.4823	4708.245	20.26362	-0.199	-0.4094	-0.5553	0.7797	2.1798	0.2392
2332	296.505	4708.226	20.24452	0.3594	0.1686	-0.4996	1.0061	1.7315	-0.1234
2333	297.5277	4708.207	20.22541	-0.4472	-0.6225	0.5221	0.4663	1.0807	0.3129
2334	298.5504	4708.187	20.20631	-1.3331	-1.1626	1.5364	-0.2476	0.4813	0.5123
2335	299.5731	4708.168	20.1872	-0.9194	-0.9532	0.745	0.6753	0.1872	-0.0836
2336	300.5957	4708.149	20.1681	-0.5265	-0.6848	0.5779	1.0931	-0.0287	-0.0532
2337	301.6184	4708.13	20.14899	0.156	-0.0577	-0.1652	0.7449	-0.4076	0.3527
2338	302.6411	4708.111	20.12989	0.8179	0.7454	-0.9455	-0.2128	-0.0368	-0.6609
2339	303.6638	4708.092	20.11078	-0.2128	-0.422	0.2509	-0.1431	0.4497	0.6113
2340	304.6864	4708.073	20.09168	-0.2542	-0.4591	0.1246	0.536	0.658	-0.6232
2341	305.7091	4708.054	20.07258	0.2009	-0.0094	-0.5182	0.7623	0.5762	-0.17
2342	306.7318	4708.035	20.05347	-1.6433	-1.2704	2.012	-0.4565	0.2732	0.8173
2343	307.7544	4708.015	20.03437	0.0285	-0.1904	-0.0389	0.5882	0.1304	-0.4415
2344	308.7771	4707.996	20.01527	-0.7781	-0.8645	1.0386	-0.3869	0.1087	0.1789

2345	309.7998	4707.977	19.99616	1.1212	1.1776	-0.9826	-0.6481	-0.5362	0.2295
2346	310.8224	4707.958	19.97706	1.4935	1.7633	-1.4285	-0.0212	-1.159	0.2601
2347	259.7049	4709.936	21.95522	-1.2607	-1.1314	0.9717	2.1031	-0.3317	-0.6379
2348	260.7277	4709.917	21.93611	-0.7436	-0.8415	0.4181	1.6155	0.2858	0.447
2349	261.7505	4709.898	21.91699	-0.885	-0.9324	1.2169	-0.77	-0.0593	0.5009
2350	262.7733	4709.879	21.89788	0.5076	0.345	-0.7448	-0.0038	-1.0188	-0.3781
2351	263.7961	4709.86	21.87877	1.3694	1.5613	-1.2724	-0.6655	-1.3156	0.0095
2352	264.8189	4709.841	21.85965	1.4349	1.6671	-1.4359	0.1529	-1.0611	0.592
2353	265.8417	4709.822	21.84054	1.7176	2.145	-1.4359	-0.8919	-1.0359	-0.379
2354	266.8645	4709.803	21.82143	1.6796	2.0789	-1.4359	-0.7526	-0.8934	-0.0478
2355	267.8873	4709.783	21.80231	1.459	1.7065	-1.4359	-0.2824	-0.7489	0.2052
2356	268.9101	4709.764	21.7832	1.2419	1.3608	-1.4136	0.9887	-0.4653	-0.0691
2357	269.9329	4709.745	21.76409	0.1354	-0.0797	-0.7225	3.6527	-0.3329	0.2691
2358	270.9557	4709.726	21.74497	0.2664	0.0628	-0.2953	1.0583	-0.5757	0.1197
2359	271.9784	4709.707	21.72586	0.3456	0.1527	-0.1689	-0.2128	-0.6037	0.7813
2360	273.0012	4709.688	21.70675	0.0423	-0.1764	-0.325	0.8494	-0.4957	-0.4735
2361	274.024	4709.669	21.68764	-1.1056	-1.0567	1.0349	0.4663	0.1647	-0.5182
2362	275.0467	4709.65	21.66852	-1.6778	-1.2798	1.7333	-0.4217	0.2793	-0.1713
2363	276.0695	4709.631	21.64941	0.9971	0.9959	-0.9195	0.2225	0.0461	0.3052
2364	277.0923	4709.611	21.6303	0.6697	0.5488	-1.0272	-0.0387	0.2415	-0.6486
2365	278.115	4709.592	21.61119	-0.361	-0.5515	0.0503	0.3967	1.2025	0.2904
2366	279.1378	4709.573	21.59208	-0.2611	-0.4652	0.0837	-0.3695	1.4089	-0.4445
2367	280.1605	4709.554	21.57297	-0.9263	-0.9573	0.9271	0.8494	1.2047	-0.157
2368	281.1833	4709.535	21.55386	-0.6954	-0.8085	0.6076	0.7101	0.5594	-0.2092
2369	282.206	4709.516	21.53475	-0.1439	-0.3584	-0.1392	1.6852	0.224	-0.3956
2370	283.2288	4709.497	21.51563	0.7627	0.6711	-0.834	0.4315	0.0969	-0.1913
2371	284.2515	4709.478	21.49652	0.5628	0.4131	-0.6557	0.6404	0.2706	0.6135
2372	285.2742	4709.459	21.47741	-0.1507	-0.3649	0.0726	0.3096	0.4839	0.238
2373	286.297	4709.439	21.4583	-0.5506	-0.7032	0.1469	2.521	0.797	0.4481
2374	287.3197	4709.42	21.43919	-0.6195	-0.7545	0.158	1.3892	0.5813	-0.0977
2375	288.3424	4709.401	21.42008	0.4422	0.2659	-1.0086	1.9812	0.8026	-0.2504

2376	289.3651	4709.382	21.40097	-1.8777	-1.3239	1.6888	0.9016	0.2268	-0.0962
2377	290.3879	4709.363	21.38187	-1.402	-1.1902	1.2058	1.8071	0.4687	0.7424
2378	291.4106	4709.344	21.36276	-0.9711	-0.9835	0.6001	2.312	0.8924	0.2136
2379	292.4333	4709.325	21.34365	-0.8884	-0.9345	0.1246	2.9214	1.7861	0.3857
2380	293.456	4709.306	21.32454	-1.4227	-1.1981	0.5667	1.7722	2.3551	-0.4051
2381	294.4787	4709.287	21.30543	0.3008	0.1015	-0.9492	3.6179	2.4343	0.2009
2382	295.5014	4709.267	21.28632	-1.4985	-1.2254	0.994	1.5285	1.6629	-0.6317
2383	296.5241	4709.248	21.26721	-0.6471	-0.7744	0.3661	0.1355	1.1639	-0.075
2384	297.5468	4709.229	21.2481	-0.3231	-0.5193	-0.1987	3.2	0.8056	-0.1132
2385	298.5695	4709.21	21.229	-0.5678	-0.7163	0.3995	1.7548	0.6468	0.1543
2386	299.5922	4709.191	21.20989	-1.0332	-1.0183	0.9643	0.2574	0.2112	0.2823
2387	300.6148	4709.172	21.19078	-1.1711	-1.0895	0.6336	3.9488	-0.2022	-0.1784
2388	301.6375	4709.153	21.17167	-0.2404	-0.4468	0.6001	-0.6307	-0.3188	0.0152
2389	302.6602	4709.134	21.15256	0.1733	-0.0393	-0.1912	0.4837	0.044	0.1444
2390	303.6829	4709.115	21.13346	0.7007	0.5892	-0.9603	0.7449	0.7833	-0.3834
2391	304.7056	4709.095	21.11435	-0.916	-0.9512	0.6967	1.9812	1.237	0.6229
2392	305.7282	4709.076	21.09524	0.3181	0.1211	-0.7151	2.016	0.9871	-0.5769
2393	306.7509	4709.057	21.07614	0.356	0.1646	-1.0867	3.2	0.5531	-0.4732
2394	307.7735	4709.038	21.05703	-1.2986	-1.148	1.4584	-0.1083	0.1216	0.3026
2395	308.7962	4709.019	21.03792	0.6524	0.5266	-0.4848	-0.7003	-0.0166	-0.1027
2396	309.8189	4709	21.01882	0.2353	0.0284	-0.1838	-0.0909	-0.5954	0.3655
2397	310.8415	4708.981	20.99971	0.8937	0.8497	-0.8749	-0.0038	-1.0571	-0.0336
2398	259.724	4710.959	22.97804	0.2043	-0.0057	-0.7337	3.2349	-0.0987	0.3346
2399	260.7468	4710.94	22.95892	0.3008	0.1015	-1.0606	1.6678	0.6338	0.6126
2400	261.7696	4710.921	22.9398	0.9489	0.9271	-0.8972	0.0484	0.4555	0.1051
2401	262.7924	4710.902	22.92069	0.6283	0.4957	-0.8191	-0.1431	-0.7304	-0.6949
2402	263.8152	4710.883	22.90157	1.7314	2.1692	-1.4359	-0.8919	-1.17	0.3823
2403	264.838	4710.864	22.88245	1.5176	1.8033	-1.4359	-0.5436	-1.229	0.5901
2404	265.8608	4710.844	22.86334	1.6555	2.0371	-1.4359	-0.474	-0.8316	-0.3168
2405	266.8836	4710.825	22.84422	1.2281	1.3395	-1.4359	0.5882	-0.8446	0.4617
2406	267.9064	4710.806	22.8251	1.3625	1.5503	-1.4359	0.919	-0.9162	0.5973

2407	268.9292	4710.787	22.80599	0.1078	-0.1088	-0.7746	3.6005	-0.7264	-0.384
2408	269.952	4710.768	22.78687	-0.7505	-0.8461	0.3289	2.2772	-0.3318	-0.6112
2409	270.9748	4710.749	22.76775	-0.9608	-0.9775	0.9271	0.4141	-0.0957	-0.5131
2410	271.9975	4710.73	22.74864	-0.8505	-0.911	1.1463	-0.265	-0.1959	-0.4884
2411	273.0203	4710.711	22.72952	-0.6299	-0.762	0.6224	0.327	-0.1953	0.2032
2412	274.0431	4710.692	22.71041	-0.6058	-0.7444	0.6596	0.7449	0.0949	0.1937
2413	275.0659	4710.672	22.69129	-0.7643	-0.8554	0.615	1.6678	-0.0026	0.5612
2414	276.0886	4710.653	22.67218	-0.5506	-0.7032	0.3438	1.7026	0.1149	-0.2571
2415	277.1114	4710.634	22.65306	1.0247	1.0357	-1.343	0.919	0.7657	-0.2714
2416	278.1341	4710.615	22.63395	0.8455	0.783	-1.1461	-0.4217	1.3755	0.1363
2417	279.1569	4710.596	22.61483	0.4732	0.3031	-0.6519	-0.7526	1.7797	0.1591
2418	280.1796	4710.577	22.59572	-1.7054	-1.2869	1.9526	-0.77	1.3771	0.0122
2419	281.2024	4710.558	22.5766	-1.1125	-1.0603	1.2466	-0.3347	0.8524	0.1638
2420	282.2251	4710.539	22.55749	-0.947	-0.9695	1.0683	0.3096	0.5155	0.622
2421	283.2479	4710.519	22.53837	-0.9401	-0.9655	1.0869	-0.0561	0.3342	0.6901
2422	284.2706	4710.5	22.51926	0.7145	0.6072	-0.8191	0.919	0.2212	-0.4242
2423	285.2933	4710.481	22.50015	-0.816	-0.8892	0.9308	0.1529	0.1536	0.5399
2424	286.3161	4710.462	22.48103	-1.0194	-1.0107	0.8194	1.4936	0.2388	0.0719
2425	287.3388	4710.443	22.46192	-0.9194	-0.9532	0.9085	-0.1605	0.1462	-0.5108
2426	288.3615	4710.424	22.44281	0.0802	-0.1375	-0.3659	1.8767	0.0626	-0.1502
2427	289.3843	4710.405	22.42369	-1.8398	-1.3169	1.9377	0.5534	0.0807	0.618
2428	290.407	4710.386	22.40458	-1.2262	-1.1157	1.1463	0.5185	0.6661	0.0095
2429	291.4297	4710.367	22.38547	-1.895	-1.3269	1.0274	0.8494	1.2738	-0.5969
2430	292.4524	4710.347	22.36636	-1.4848	-1.2206	0.8974	0.832	1.761	-0.5546
2431	293.4751	4710.328	22.34724	-0.8402	-0.9045	0.4404	2.0856	1.3372	-0.574
2432	294.4978	4710.309	22.32813	-1.1745	-1.0912	0.1803	6.1079	1.2219	0.632
2433	295.5205	4710.29	22.30902	-0.623	-0.757	0.4738	1.2673	0.7835	0.0182
2434	296.5432	4710.271	22.28991	-1.1435	-1.076	1.3284	-0.5958	0.7477	-0.5616
2435	297.5659	4710.252	22.2708	-0.7161	-0.8228	0.6336	0.7623	0.3986	0.2361
2436	298.5886	4710.233	22.25168	-1.016	-1.0088	0.9122	1.3021	0.3496	-0.1698
2437	299.6113	4710.214	22.23257	-1.664	-1.2761	1.7631	1.1802	0.4492	0.2164

2438	300.634	4710.195	22.21346	-1.4434	-1.2058	0.9977	3.3916	0.1964	0.0564
2439	301.6566	4710.175	22.19435	-0.299	-0.4985	0.563	-0.5784	-0.0551	-0.0311
2440	302.6793	4710.156	22.17524	-0.3576	-0.5486	0.5221	-0.0387	-0.0489	0.5991
2441	303.702	4710.137	22.15613	0.6283	0.4957	-0.808	0.536	0.8066	-0.5569
2442	304.7247	4710.118	22.13702	0.7248	0.6208	-1.0384	0.8842	1.2361	0.0792
2443	305.7473	4710.099	22.11791	-0.4644	-0.6362	0.1097	2.3817	1.0812	0.3749
2444	306.77	4710.08	22.0988	-0.4679	-0.639	0.0726	2.312	0.6963	0.0523
2445	307.7927	4710.061	22.07969	-0.3679	-0.5573	0.4367	0.0658	0.6629	0.3033
2446	308.8153	4710.042	22.06058	0.2526	0.0474	-0.3733	0.4663	0.5399	-0.365
2447	309.838	4710.023	22.04147	1.1143	1.1674	-0.8934	-0.6655	-0.2938	0.3798
2448	310.8606	4710.003	22.02236	1.3901	1.5945	-1.135	-0.561	-0.8212	0.2058
2449	259.7431	4711.982	24.00086	-0.3748	-0.5631	0.106	1.6329	-0.3979	0.4277
2450	260.7659	4711.963	23.98173	0.6352	0.5045	-1.0532	2.4165	0.5965	0.4156
2451	261.7887	4711.944	23.96261	-0.6678	-0.7891	0.3772	0.9713	0.347	-0.5407
2452	262.8115	4711.925	23.94349	0.2595	0.0551	-0.5776	1.4066	-0.5525	-0.3147
2453	263.8343	4711.905	23.92437	1.7141	2.139	-1.4359	-0.8744	-1.1184	0.3482
2454	264.8571	4711.886	23.90525	1.7382	2.1814	-1.4359	-0.8919	-1.1518	0.0719
2455	265.8799	4711.867	23.88613	1.7382	2.1814	-1.4359	-0.8919	-0.6692	0.1413
2456	266.9027	4711.848	23.86701	1.6452	2.0193	-1.4359	-0.8919	-1.0091	-0.1258
2457	267.9255	4711.829	23.84789	1.621	1.9779	-1.4359	-0.3172	-1.3799	-0.3832
2458	268.9483	4711.81	23.82877	1.2729	1.4089	-1.4359	1.4762	-1.0069	-0.5505
2459	269.9711	4711.791	23.80965	-0.4403	-0.6169	0.002	3.3045	-0.3796	0.4864
2460	270.9939	4711.772	23.79053	-1.4606	-1.2121	1.2949	1.8941	-0.1944	-0.2711
2461	272.0167	4711.753	23.77141	-1.6916	-1.2834	1.8151	0.1877	-0.2811	-0.4189
2462	273.0394	4711.733	23.75229	-1.3917	-1.1862	1.8225	-0.6481	-0.2311	0.6103
2463	274.0622	4711.714	23.73317	-1.209	-1.1077	1.1723	1.1802	-0.3269	0.2019
2464	275.085	4711.695	23.71406	-0.9298	-0.9594	0.8714	1.1802	-0.2099	0.6257
2465	276.1077	4711.676	23.69494	0.7938	0.7127	-1.0235	1.4066	-0.2586	-0.1246
2466	277.1305	4711.657	23.67582	1.2074	1.3078	-1.4025	1.4762	0.5648	-0.3082
2467	278.1533	4711.638	23.6567	-0.4058	-0.5888	-0.481	1.8245	1.2441	-0.5732
2468	279.176	4711.619	23.63758	0.7731	0.6849	-0.99	0.5882	1.9896	-0.0878

2469	280.1988	4711.6	23.61847	-1.2641	-1.1329	1.2615	-0.2128	1.3917	0.3707
2470	281.2215	4711.58	23.59935	0.063	-0.1553	-0.3101	0.6753	0.844	-0.3455
2471	282.2443	4711.561	23.58023	-0.3989	-0.5831	-0.3436	1.9463	0.2516	0.0087
2472	283.267	4711.542	23.56111	-0.9263	-0.9573	0.3586	2.6428	0.6364	-0.0609
2473	284.2897	4711.523	23.542	-2.0432	-1.3472	2.1792	0.1877	1.0472	-0.2144
2474	285.3125	4711.504	23.52288	-0.9022	-0.9429	1.02	-0.0212	0.9064	0.0929
2475	286.3352	4711.485	23.50376	-1.5227	-1.2335	1.9117	-0.6307	0.5508	0.3001
2476	287.3579	4711.466	23.48465	-1.6537	-1.2733	1.6256	-0.3347	0.3123	-0.6777
2477	288.3806	4711.447	23.46553	-0.8815	-0.9303	0.8937	0.7101	0.2613	0.1029
2478	289.4034	4711.428	23.44641	-0.7436	-0.8415	0.5481	1.7548	0.3253	0.398
2479	290.4261	4711.408	23.4273	-1.7915	-1.3071	0.8825	1.6329	0.5324	-0.2905
2480	291.4488	4711.389	23.40818	-1.5503	-1.2425	1.1129	3.3742	1.0432	0.3471
2481	292.4715	4711.37	23.38906	-1.2607	-1.1314	0.9977	2.1031	1.0364	0.1382
2482	293.4942	4711.351	23.36995	-0.8781	-0.9282	0.7636	1.2673	0.8625	-0.0682
2483	294.5169	4711.332	23.35083	-1.2676	-1.1345	1.1389	1.4936	0.8189	-0.086
2484	295.5396	4711.313	23.33172	-1.1435	-1.076	0.7005	3.2523	0.6431	0.5428
2485	296.5623	4711.294	23.3126	-1.2366	-1.1205	0.8231	0.6578	0.443	-0.5461
2486	297.585	4711.275	23.29349	-1.1366	-1.0725	1.0088	0.327	0.1557	-0.1998
2487	298.6077	4711.255	23.27437	-1.1849	-1.0962	0.7525	3.409	0.2217	0.463
2488	299.6304	4711.236	23.25526	-2.0432	-1.3472	2.0677	0.9713	0.3857	0.5401
2489	300.6531	4711.217	23.23614	-1.4158	-1.1955	0.6856	4.1229	0.3525	-0.1191
2490	301.6758	4711.198	23.21703	-1.8915	-1.3263	1.3804	3.7572	0.1258	0.2868
2491	302.6984	4711.179	23.19791	-1.6192	-1.2636	1.9451	-0.2302	-0.018	0.6576
2492	303.7211	4711.16	23.1788	0.8799	0.8305	-1.1498	1.4588	0.8842	-0.4811
2493	304.7438	4711.141	23.15969	0.7627	0.6711	-1.2799	2.9214	1.7377	0.4431
2494	305.7664	4711.122	23.14057	0.4422	0.2659	-1.0792	2.521	1.4024	-0.6183
2495	306.7891	4711.103	23.12146	-1.0918	-1.0496	1.2095	0.1703	0.6631	0.5227
2496	307.8118	4711.083	23.10235	-0.9884	-0.9933	0.4738	2.608	0.4708	-0.1376
2497	308.8344	4711.064	23.08323	-0.8091	-0.8847	0.4924	2.1727	0.6677	0.1792
2498	309.8571	4711.045	23.06412	0.1181	-0.0979	-0.1764	0.2574	-0.2381	0.1711
2499	310.8797	4711.026	23.04501	0.5214	0.3619	-0.886	1.2499	-0.8341	-0.3078

2500	259.7622	4713.005	25.02367	-0.0577	-0.2761	-0.7634	4.0532	-1.0401	0.6808
2501	260.785	4712.986	25.00455	-0.3645	-0.5544	-0.4662	3.5831	-0.4337	-0.3447
2502	261.8079	4712.967	24.98542	0.1009	-0.116	-0.6185	1.5981	-0.4387	-0.1754
2503	262.8307	4712.947	24.9663	1.0385	1.0557	-1.4359	2.3817	-0.9221	-0.0438
2504	263.8535	4712.928	24.94717	1.5556	1.8668	-1.4359	-0.1083	-1.4417	-0.2034
2505	264.8763	4712.909	24.92805	1.7072	2.1269	-1.4359	-0.8222	-1.2825	0.404
2506	265.8991	4712.89	24.90893	1.2453	1.3661	-1.4359	0.1877	-1.2408	0.7952
2507	266.9219	4712.871	24.8898	1.7038	2.1209	-1.4359	-0.8919	-1.3836	-0.3828
2508	267.9447	4712.852	24.87068	1.7348	2.1753	-1.4359	-0.8744	-1.7576	0.1606
2509	268.9674	4712.833	24.85156	0.7627	0.6711	-1.1795	2.521	-1.7163	0.1696
2510	269.9902	4712.814	24.83243	-0.2093	-0.4188	-0.3101	3.0956	-1.3298	0.4621
2511	271.013	4712.794	24.81331	-0.6954	-0.8085	0.4292	1.9115	-0.9123	-0.1893
2512	272.0358	4712.775	24.79419	-1.7226	-1.2912	1.9934	-0.0909	-0.5682	-0.1361
2513	273.0586	4712.756	24.77507	-0.4644	-0.6362	0.2658	0.8668	-0.555	-0.2698
2514	274.0813	4712.737	24.75594	-1.988	-1.3408	2.3241	-0.5784	-0.6531	0.2937
2515	275.1041	4712.718	24.73682	-1.9949	-1.3416	2.2721	-0.474	-0.679	0.2597
2516	276.1269	4712.699	24.7177	-1.8984	-1.3275	1.9711	0.9016	-0.6854	0.1812
2517	277.1496	4712.68	24.69858	0.3525	0.1606	-0.247	0.4663	-0.1114	0.2476
2518	278.1724	4712.661	24.67946	-0.6919	-0.8061	-0.4104	4.9761	0.7283	-0.3847
2519	279.1951	4712.641	24.66034	-1.1021	-1.055	0.4069	1.4066	1.2536	0.0169
2520	280.2179	4712.622	24.64121	-0.199	-0.4094	-1.2316	2.904	0.7188	-0.0676
2521	281.2406	4712.603	24.62209	0.4835	0.3156	-1.3059	2.608	0.2079	-0.2659
2522	282.2634	4712.584	24.60297	1.104	1.152	-1.2427	0.0484	-0.1726	-0.2024
2523	283.2861	4712.565	24.58385	-1.4434	-1.2058	1.1686	0.1703	0.5627	-0.3
2524	284.3088	4712.546	24.56473	-1.7019	-1.2861	1.0349	0.3792	1.0599	-0.4063
2525	285.3316	4712.527	24.54561	-1.6399	-1.2695	1.3358	0.0832	1.0661	-0.2306
2526	286.3543	4712.508	24.52649	-0.9229	-0.9553	0.3772	0.1181	0.9736	0.0648
2527	287.377	4712.488	24.50737	-1.9363	-1.3335	1.5401	0.0832	0.9772	-0.578
2528	288.3998	4712.469	24.48825	-1.9708	-1.3385	2.1123	-0.5436	1.0274	0.2093
2529	289.4225	4712.45	24.46913	-1.3193	-1.1568	0.2732	0.8668	0.5522	-0.656
2530	290.4452	4712.431	24.45001	-0.7988	-0.878	0.2323	2.2424	0.4433	-0.0385

2531	291.4679	4712.412	24.43089	-0.6506	-0.7769	0.6484	0.6404	-0.0232	0.3204
2532	292.4906	4712.393	24.41177	-1.6054	-1.2595	1.856	-0.0387	-0.3514	0.6371
2533	293.5133	4712.374	24.39265	-0.5058	-0.6688	-0.1244	4.0532	-0.1481	-0.2328
2534	294.536	4712.355	24.37354	-1.0401	-1.022	0.5296	3.0607	0.0822	-0.1044
2535	295.5587	4712.336	24.35442	-0.8643	-0.9196	0.8714	0.9364	0.147	0.4055
2536	296.5814	4712.316	24.3353	-1.1918	-1.0995	-0.5182	2.5906	-0.0141	-0.3373
2537	297.6041	4712.297	24.31618	-2.1259	-1.3543	2.2609	-0.8919	-0.4277	-0.3803
2538	298.6268	4712.278	24.29706	-0.6127	-0.7495	0.7859	-0.6655	-0.2375	-0.1844
2539	299.6495	4712.259	24.27794	0.9558	0.9369	-1.2464	1.128	0.0649	-0.5925
2540	300.6722	4712.24	24.25883	0.1388	-0.0761	-0.2878	1.511	0.1859	0.0672
2541	301.6949	4712.221	24.23971	-1.1469	-1.0777	0.5741	3.7224	-0.1998	-0.4105
2542	302.7175	4712.202	24.22059	-1.7157	-1.2895	1.8745	0.5185	-0.2308	0.6396
2543	303.7402	4712.183	24.20147	0.8075	0.7313	-0.7931	0.1181	0.7296	-0.4083
2544	304.7629	4712.163	24.18236	0.8317	0.7641	-1.2761	2.608	1.3978	0.0296
2545	305.7856	4712.144	24.16324	-0.3059	-0.5045	-0.73	5.8467	1.3667	0.3304
2546	306.8082	4712.125	24.14412	-0.0129	-0.2319	-0.0835	1.2324	0.9058	0.0186
2547	307.8309	4712.106	24.125	-0.1645	-0.3777	0.2658	0.3967	0.2888	0.0715
2548	308.8535	4712.087	24.10589	-1.0539	-1.0295	0.5667	3.0259	0.4888	0.5725
2549	309.8762	4712.068	24.08677	0.9661	0.9515	-0.9566	-0.1083	-0.2842	-0.1059
2550	310.8988	4712.049	24.06765	0.5731	0.426	-1.1461	2.3468	-0.794	0.2128
2551	259.7814	4714.028	26.04649	-0.7195	-0.8251	0.3884	1.4762	-1.4128	-0.3228
2552	260.8042	4714.008	26.02736	-0.7092	-0.818	-0.0463	3.2349	-1.1968	-0.5969
2553	261.827	4713.989	26.00823	-0.6471	-0.7744	0.0354	4.1229	-1.1575	0.6996
2554	262.8498	4713.97	25.9891	-0.6368	-0.767	0.5296	1.4414	-1.5407	-0.5281
2555	263.8726	4713.951	25.96998	0.4284	0.2495	-0.6817	1.5459	-1.6708	-0.1912
2556	264.8954	4713.932	25.95085	0.9454	0.9222	-1.4359	2.8518	-1.4661	0.6607
2557	265.9182	4713.913	25.93172	0.8006	0.722	-1.1015	1.6852	-1.4647	-0.416
2558	266.941	4713.894	25.9126	1.721	2.1511	-1.4359	-0.8396	-1.6518	0.5709
2559	267.9638	4713.875	25.89347	1.7245	2.1571	-1.4359	-0.8919	-2.0896	-0.3715
2560	268.9866	4713.855	25.87434	-1.1159	-1.062	0.6819	2.7995	-1.9654	0.6006
2561	270.0093	4713.836	25.85522	-1.0677	-1.0369	1.2652	0.1877	-1.6433	-0.1591

2562	271.0321	4713.817	25.83609	-1.4606	-1.2121	1.3209	1.6503	-1.3364	0.5399
2563	272.0549	4713.798	25.81696	-0.5713	-0.7188	-0.1355	4.3841	-1.1176	-0.279
2564	273.0777	4713.779	25.79784	-0.916	-0.9512	1.0051	0.4663	-0.9527	-0.5093
2565	274.1004	4713.76	25.77871	-1.9019	-1.3281	2.2758	-0.4391	-0.9828	0.2893
2566	275.1232	4713.741	25.75959	-1.3986	-1.1889	1.5104	0.4837	-1.2387	0.2803
2567	276.146	4713.722	25.74046	-2.1673	-1.3567	2.4318	-0.4043	-1.2609	-0.187
2568	277.1687	4713.702	25.72134	0.0871	-0.1303	-0.4402	2.1727	-0.8854	0.2916
2569	278.1915	4713.683	25.70221	-1.3813	-1.1822	-0.1169	3.5483	-0.3239	-0.6365
2570	279.2143	4713.664	25.68309	-1.2124	-1.1093	-0.1281	1.1454	0.182	-0.0248
2571	280.237	4713.645	25.66396	-0.3265	-0.5223	-0.8637	1.9638	-0.0694	-0.3432
2572	281.2597	4713.626	25.64484	0.0044	-0.2147	-0.4773	1.5285	-0.7439	-0.1749
2573	282.2825	4713.607	25.62571	-0.4748	-0.6445	0.511	-0.1083	-0.943	0.0455
2574	283.3052	4713.588	25.60659	-1.9742	-1.339	2.2349	-0.6133	-0.182	0.4376
2575	284.328	4713.569	25.58747	-2.0087	-1.3433	1.425	0.4489	0.2911	-0.1505
2576	285.3507	4713.549	25.56834	-1.5916	-1.2554	-0.6482	-0.7351	0.4642	-0.5618
2577	286.3734	4713.53	25.54922	-1.9053	-1.3286	0.9828	-0.561	0.484	-0.4378
2578	287.3962	4713.511	25.5301	-1.8881	-1.3257	0.8974	-0.3695	0.5665	-0.011
2579	288.4189	4713.492	25.51097	-1.1745	-1.0912	0.4292	1.215	0.5442	0.0064
2580	289.4416	4713.473	25.49185	-1.5503	-1.2425	1.2466	1.9115	0.0493	0.4725
2581	290.4643	4713.454	25.47273	-0.0301	-0.249	-0.3473	2.1901	-0.346	0.3118
2582	291.487	4713.435	25.4536	-0.9987	-0.9992	0.5184	0.7101	-0.887	-0.559
2583	292.5097	4713.416	25.43448	-0.1266	-0.3422	-0.0649	-0.2302	-1.0191	0.1256
2584	293.5325	4713.396	25.41536	0.3629	0.1726	-0.507	0.6753	-1.2514	-0.1608
2585	294.5552	4713.377	25.39624	-0.0404	-0.2592	0.1134	0.0832	-0.8536	0.5358
2586	295.5779	4713.358	25.37711	-1.402	-1.1902	1.8225	-0.7351	-0.7899	0.7
2587	296.6006	4713.339	25.35799	-0.2886	-0.4895	-1.0495	-0.1431	-0.8693	-0.0036
2588	297.6232	4713.32	25.33887	-2.2086	-1.3584	0.0057	-0.8919	-1.1323	-0.5144
2589	298.6459	4713.301	25.31975	0.1871	-0.0244	-0.1727	0.3096	-0.9584	-0.0587
2590	299.6686	4713.282	25.30063	0.0492	-0.1694	-0.1206	1.128	-0.9115	0.5999
2591	300.6913	4713.263	25.28151	0.6042	0.465	-0.8377	0.7797	-0.6616	-0.4488
2592	301.714	4713.244	25.26239	-1.6571	-1.2743	1.659	0.4489	-1.0354	0.6274

2593	302.7367	4713.224	25.24326	0.3008	0.1015	-0.1355	-0.0561	-0.8648	0.3254
2594	303.7593	4713.205	25.22414	0.3594	0.1686	-0.7225	0.3792	-0.189	-0.4866
2595	304.782	4713.186	25.20502	-0.592	-0.7342	0.0837	3.0781	0.7316	0.3032
2596	305.8047	4713.167	25.1859	-1.1952	-1.1012	0.3958	4.4537	0.5601	0.8218
2597	306.8273	4713.148	25.16678	-0.3472	-0.5399	-0.4513	4.0706	-0.2066	-0.6083
2598	307.85	4713.129	25.14766	-0.2197	-0.4282	-0.6445	4.0881	-0.685	0.0261
2599	308.8727	4713.11	25.12854	0.0664	-0.1517	-0.4067	2.1205	-0.6466	0.7448
2600	309.8953	4713.091	25.10942	0.1354	-0.0797	-0.6854	2.4339	-1.1623	0.4031
2601	310.918	4713.071	25.0903	0.8558	0.7972	-0.6631	-0.4217	-1.3759	-0.0859

A1.2 R scripts for data processing, SCR Model description, Bayesian implementation, post processing

```
library("lattice")
library("coda")
library("abind")
library("runjags")
getwd()

# insert trap locations
traplocs<-read.csv(“traplocs_2012.csv")

J<-nrow(traplocs);J
traplocs<-traplocs[1:J,]
head(traplocs)
attach(traplocs)
plot(easting,northing)
X<-traplocs[,c(4,5)]
X[,1]<-(X[,1]/1000)
X[,2]<-(X[,2]/1000)
X<-as.matrix(X)

Xl<-min(X[,1])
Yl<-min(X[,2])
Xu<-max(X[,1])
Yu<-max(X[,2])

# insert trap relocations
trap_reloc<-matrix(data=0,nrow=J,ncol=10)
trap_reloc[traplocs[,8]==1,1:5]<-1
trap_reloc[traplocs[,8]==2,6:10]<-1
trap_reloc[traplocs[,8]==3,]<-1
m<-trap_reloc
m<-as.matrix(m)

# insert/create nonspat enchist
ijk_2012<-read.csv("ijk_2012.csv")

nind<-max(ijk_2012[,1])
K<-10
enchist_nonspat<-array(0,dim=c(nind,K))
IJ<-array(0,dim=c(nind,J))
for(i in 1:nrow(ijk_2012)){
  enchist_nonspat[ijk_2012[i,1],ijk_2012[i,2]]<-1
  IJ[ijk_2012[i,1],ijk_2012[i,5]]<-1
}

# create spat enchist
enchist_spat<-array(0,dim=c(nind,J,K))
for (i in 1:nrow(ijk_2012)){
  enchist_spat[ijk_2012[i,1],ijk_2012[i,5],ijk_2012[i,2]]<-1
}
y<-enchist_spat
nind<-nrow(y)
dim(y)
```

```
########################
### covariates! yay! ###
########################

#  sex cov
#Sex<-read.csv("sex_cov.csv")[,-1]
sex_cov<-array("NA",dim=c(nind,1))
for ( i in 1:nrow(ijk_2012)){
  sex_cov[ijk_2012[i,1],1]<-ijk_2012[i,8]
}
Sex<-sex_cov

#  ind cov
first_enc<-read.csv("first_enc_2012.csv") # just the detection per i
                                          # at earliest k

ind_cov<-array(0,dim=c(nind,K))
for (i in 1:nind){
  a<-first_enc[i,2]
  #a<-which.max(enchist_nonspat[i,])
  a<-as.numeric(a)
  if(a<10){
    ind_cov[i,(a+1):K]<-1
  }
}
IND<-ind_cov

########################
## density covariates ##
########################
DensCov<-read.csv("allCovs_1km.csv")
DensCov<-as.matrix(DensCov)
nPix_dens<-nrow(DensCov)
pix_coord_dens<-DensCov[,c(2,3)]
pixArea_dens<-1

#assign each trap to the closest density pixel
d<-matrix(NA,nrow=J,ncol=nPix_dens)
trap_denspix<-rep(NA,J)
for (j in 1:J){
  for (r in 1:nPix_dens){
    d[j,r]<-sqrt((X[j,1]-DensCov[r,2])^2+
                (X[j,2]-DensCov[r,3])^2) }
  trap_denspix[j]<-which.min(d[j,])
}

## assigning individuals to the closest density pixel ##
first_denspix<-matrix(NA,nrow=nrow(first_enc), ncol=4)
for(i in (1:nrow(first_enc))){
  first_denspix[i,1]<-first_enc[i,5] # trap
  first_denspix[i,2]<-trap_denspix[first_denspix[i,1]] #pixel
  first_denspix[i,3]<-pix_coord_dens[first_denspix[i,2],1] # x coord of pix
  first_denspix[i,4]<-pix_coord_dens[first_denspix[i,2],2] # y coord of pix
}

##########################
## encounter covariates ##
```

```
##########################

encCov<-DensCov[,c(1,2,3,5,7,8,9,10)]

nPix_enc<-nrow(encCov)
pix_coord_enc<-encCov[,c(2,3)]

#assign each trap to the closest enc pixel
d<-matrix(NA,nrow=J,ncol=nPix_enc)
trap_encpix<-rep(NA,J)
for (j in 1:J){
  for (r in 1:nPix_enc){
    d[j,r]<-sqrt((X[j,1]-encCov[r,2])^2+
                 (X[j,2]-encCov[r,3])^2) }
  trap_encpix[j]<-which.min(d[j,])
}

#redoing the encCov matrix so that it's the covariates for the traps based on
the pixel
encCovs<-matrix(NA,nrow=J,ncol=ncol(encCov))
for(j in 1:J){
  encCovs[j,1]<-trap_encpix[j]
  encCovs[j,2:8]<-encCov[encCovs[j,1],2:8]
}

## assigning individuals to the closest enc pixel ##
first_encpix<-matrix(NA,nrow=nrow(first_enc), ncol=4)
for(i in (1:nrow(first_enc))){
  first_encpix[i,1]<-first_enc[i,5] # trap
  first_encpix[i,2]<-trap_encpix[first_encpix[i,1]] #pixel
  first_encpix[i,3]<-pix_coord_enc[first_encpix[i,2],1] # x coord of pix
  first_encpix[i,4]<-pix_coord_enc[first_encpix[i,2],2] # y coord of pix
}

## matrix with the first pixels for each detected individual (dens and enc
pixels)

first_pix<-matrix(NA,nrow=nrow(first_enc),ncol=3)
for (i in 1:nrow(first_pix)){
  first_pix[i,1]<-first_enc[i,5]
  first_pix[i,2]<-first_denspix[i,2]
  first_pix[i,3]<-first_encpix[i,2]
}

## matrix interchanging density and encounter pixels
# calculated distances between each density and each encounter pixel
d<-matrix(NA,nrow=nPix_dens,ncol=nPix_enc)
for (j in 1:nPix_dens){
  for (r in 1:nPix_enc){
    d[j,r]<-sqrt((pix_coord_dens[j,1]-pix_coord_enc[r,1])^2+
                 (pix_coord_dens[j,2]-pix_coord_enc[r,2])^2) }}
#assign each density pixel to the closest encounter pixel.
# if encounter is at 1km, then they will be the same
densEnc_pixs<-matrix(NA, nrow=nPix_dens,ncol=2)
for(i in 1:nrow(densEnc_pixs)){
  densEnc_pixs[i,1]<-DensCov[i,1]
  densEnc_pixs[i,2]<-which.min(d[i,])
```

```
}

#####################
#####################

M<- 500
J<-nrow(traplocs)
Y<-abind(y,array(0,dim=c((M-nind),J,K)),along=1)

Sex<-c(Sex,rep("NA",(M-nind)))
Sex<-as.numeric(Sex)
IND<-abind(IND,matrix(0,nrow=(M-nind),ncol=K),along=1)

unknowns_denspix<-sample(1:nPix_dens, M-nind, replace=T)
unknowns_encpix<-sample(1:nPix_enc,M-nind,replace=T)
s<-c(as.numeric(first_pix[,2]),unknowns_denspix)  # the pixels of s are the
density pixels of teh first encs
z=rep(1,M)

##############################################################################
##
model<-"
model{

beta0~dunif(-20,10) # mu intercept
beta1~dunif(-10,10) # density;latitude
beta2~dunif(-10,10) # density;forest linear
beta3~dunif(-10,10) # density;forest quadratic
beta4~dunif(-10,10) # density; ag
beta5~dunif(-10,10) # density; shrub
beta6~dunif(-10,10) # density; road
beta7~dunif(-10,10) # density; tpi

beta8~dunif(-10,10) # encounter; forest
beta9~dunif(-10,10) # encounter; ag
beta10~dunif(-10,10) # encounter; shrub
beta11~dunif(-10,10) # encounter; road
beta12~dunif(-10,10) # encounter; ag

w[1]~dbern(0.5) # indicator variable for latitude cov in density
w[2]~dbern(0.5) # indicator variable for forest cov on density
w[3]~dbern(0.5) # indicator variable for forest2 cov on density
w[4]~dbern(0.5) # indicator variable for ag on density
w[5]~dbern(0.5) # indicator variable for shrub on density
w[6]~dbern(0.5) # indicator variable for road on density
w[7]~dbern(0.5) # indicator variable for tpi on density
w[8]~dbern(0.5) # indicator variable for forest on encounter
w[9]~dbern(0.5) # indicator variable for ag on encounter
w[10]~dbern(0.5) # indicator variable for shrub on encounter
w[11]~dbern(0.5) # indicator variable for road on encounter
w[12]~dbern(0.5) # indicator variable for ag on encounter

sigma[1]~dunif(0,25)
sigma[2]~dunif(0,25)
loglam0~dunif(-10,10)
tau~dunif(0,1)      # sex
alpha~dunif(-10,10) # encounter;behavior
```

```
delta~dunif(-10,10) # encounter;sex

for (r in 1:nPix_dens){
mu[r]<-
exp(beta0+w[1]*beta1*DensCov[r,4]+w[2]*beta2*DensCov[r,5]+w[2]*w[3]*beta3*Den
sCov[r,6]+w[4]*beta4*DensCov[r,7]+w[5]*beta5*DensCov[r,8]+w[6]*beta6*DensCov[
r,9]+w[7]*beta7*DensCov[r,10])*1
probs[r]<-mu[r]/EN
}
EN<-sum(mu[])
psi<-EN/M

for (i in 1:M){
z[i]~dbern(psi)
s[i]~dcat(probs[])
Sex[i]~dbern(tau)
Sex2[i]<-Sex[i]+1

x0g[i]<-pix_coord_enc[densEnc_pixs[s[i],2],1]
y0g[i]<-pix_coord_enc[densEnc_pixs[s[i],2],2]

for (j in 1:J){
dist[i,j]<-sqrt(pow(x0g[i]-X[j,1],2)+ pow(y0g[i]-X[j,2],2))
for(k in 1:K){
log(lam0[i,j,k])<-loglam0+alpha*IND[i,k]+delta*Sex[i]+
w[8]*beta8*encCovs[j,4]+w[9]*beta9*encCovs[j,5]+w[10]*beta10*encCovs[j,7]+w[1
1]*beta11*encCovs[j,7]+w[12]*beta12*encCovs[j,8]lambda[i,j,k]<-
lam0[i,j,k]*exp(-dist[i,j]*dist[i,j]/(2*sigma[Sex2[i]]^2))*z[i]*m[j,k]
Y[i,j,k]~dbin(lambda[i,j,k],1)

}
}
}
N<-sum(z[])
D<-N/((Xu-Xl)*(Yu-Yl))
}
"

################################

data <-
dump.format(list(Y=Y,m=m,Sex=Sex,IND=IND,X=X,K=K,M=M,J=J,Xl=Xl,Xu=Xu,Yl=Yl,Yu
=Yu,pix_coord_enc=pix_coord_enc,
densEnc_pixs=densEnc_pixs,DensCov=DensCov,encCovs=encCovs,
nPix_dens=nPix_dens))

inits <- dump.format(list(beta0=-20,beta1=0.3,beta2=0.3,beta3=0.3,beta4=-
0.1,beta5=0.1,beta6=-0.1,beta7=0.1,beta8=0.2,beta9=-0.1,beta10=0.1,beta11=-
0.2,beta12=0.2,loglam0=-3,sigma=c(4,6),alpha=0.5,delta=-0.5,tau=0.5, s=s,
z=z,w=c(1,1,1,1,1,1,1,1,1,1,1,1)))
params <-
c("beta0","beta1","beta2","beta3","beta4","beta5","beta6","beta7","beta8","be
ta9","beta10","beta11","beta12","loglam0","sigma",
"alpha","delta","N","D","s","w")

nt<-1
nc<-1
```

```
nb<-2000
ni<-10000

set.seed(123)
all1Covs_2012<- run.jags(model=model,data=data, inits=inits, monitor=params,
n.chains = nc, thin = nt, sample = ni, burnin =
nb,jags="/home/fs01/cs752/JAGS-3.3.0/bin/jags")

###############
## post proc ##
###############

names(all1Covs_2012)

# scale CHANGES HERE
sink(paste("unifIndVar_2012a_summary",".txt"))
print(all1Covs_2012$timetaken)
print(all1Covs_2012$summary)
sink()

# scale CHANGES HERE
write.csv(all1Covs_2012$mcmc[[1]],"unifIndVar_2012a_mcmc.csv")

# scale CHANGES HERE
parameters<-
c("loglam0","sigma[1]","sigma[2]","N","D","alpha","delta","beta0","beta1","be
ta2","beta3","beta4","beta5","beta6","beta7","beta8","beta9","beta10","beta11
","beta12")
for(i in 1:length(parameters)){
  a<-mcmc.list(all1Covs_2012$mcmc[[1]][,parameters[i]])
  assign(paste(parameters[i],"_",1,".coda",sep=""),a)

dump(paste(parameters[i],"_",1,".coda",sep=""),file=paste("oneKM2012_unifIndV
ar_",parameters[i],"_",1,".coda",".R",sep=""))
}

 parameters<-
c("N","D","sigma[1]","sigma[2]","loglam0","alpha","delta","beta0","beta1","be
ta2","beta3","beta4","beta5","beta6","beta7","beta8","beta9","beta10","beta11
","beta12")
 chains<-3

 ## source in coda files from all chains
 for(i in 1:length(parameters)){
   for(c in 1:chains){
   source(paste("oneKM2012_norm_",parameters[i],"_",c,".coda.R",sep=""))
   }
 }
 ## create mcmc list with all the chains
 for(i in 1:length(parameters)){
   a<-as.mcmc.list(c(get(paste(parameters[i],"_",1,".coda",sep="")),
                     get(paste(parameters[i],"_",2,".coda",sep="")),
                     get(paste(parameters[i],"_",3,".coda",sep=""))))
   assign(paste(parameters[i],".coda",sep=""),a)
 }

 parameters2<-c("sigma[1]","sigma[2]")
```

```
 params3<-c("sigma_f","sigma_m")
 for(i in 1:length(parameters2)){
   a<-as.mcmc.list(c(get(paste(parameters2[i],"_",1,".coda",sep="")),
                     get(paste(parameters2[i],"_",2,".coda",sep="")),
                     get(paste(parameters2[i],"_",3,".coda",sep=""))))
   assign(paste(params3[i],".coda",sep=""),a)
 }

summary(D.coda);gelman.diag(D.coda);plot(D.coda)
 summary(N.coda);gelman.diag(N.coda);plot(N.coda)
 summary(sigma_m.coda);gelman.diag(sigma_m.coda);plot(sigma_m.coda)
 summary(sigma_f.coda);gelman.diag(sigma_f.coda);plot(sigma_f.coda)
 summary(alpha.coda);gelman.diag(alpha.coda);plot(alpha.coda)
 summary(delta.coda);gelman.diag(delta.coda);plot(delta.coda)
 summary(loglam0.coda);gelman.diag(loglam0.coda);plot(loglam0.coda)
 summary(beta0.coda);gelman.diag(beta0.coda);plot(beta0.coda)
 summary(beta1.coda);gelman.diag(beta1.coda);plot(beta1.coda)
# repeat for all betas

chain1mcmc<-read.csv("norm_2012a_mcmc.csv",header=TRUE)
chain1mcmc<-t(chain1mcmc)
N_1<-chain1mcmc[3,]
z_1<-matrix(1,nrow=500,ncol=15000)
for(i in 1:nrow(z_1)){
  for (j in 1:ncol(z_1)){
    if(i>N_1[j])z_1[i,j]<-0
  }
}
s_1<-chain1mcmc[20:519,]
s_1coordsX<-matrix(NA,nrow=nrow(s_1),ncol=ncol(s_1))
for(i in 1:nrow(s_1coordsX)){
  for (j in 1:ncol(s_1coordsX)){
    s_1coordsX[i,j]<-DensCov[s_1[i,j],2]
  }
}
s_1coordsY<-matrix(NA,nrow=nrow(s_1),ncol=ncol(s_1))
for(i in 1:nrow(s_1coordsY)){
  for (j in 1:ncol(s_1coordsY)){
    s_1coordsY[i,j]<-DensCov[s_1[i,j],3]
  }
}

chain2mcmc<-read.csv("norm_2012b_mcmc.csv",header=TRUE)
chain2mcmc<-t(chain2mcmc)
N_2<-chain2mcmc[3,]
z_2<-matrix(1,nrow=500,ncol=15000)
for(i in 1:nrow(z_2)){
  for (j in 1:ncol(z_2)){
    if(i>N_2[j])z_2[i,j]<-0
  }
}
s_2<-chain2mcmc[20:519,]
s_2coordsX<-matrix(NA,nrow=nrow(s_2),ncol=ncol(s_2))
for(i in 1:nrow(s_2coordsX)){
  for (j in 1:ncol(s_2coordsX)){
    s_2coordsX[i,j]<-DensCov[s_2[i,j],2]
  }
```

```
}
s_2coordsY<-matrix(NA,nrow=nrow(s_2),ncol=ncol(s_2))
for(i in 1:nrow(s_2coordsY)){
  for (j in 1:ncol(s_2coordsY)){
    s_2coordsY[i,j]<-DensCov[s_2[i,j],2]
  }
}
chain3mcmc<-read.csv("norm_2012c_mcmc.csv",header=TRUE)
chain3mcmc<-t(chain3mcmc)
N_3<-chain3mcmc[3,]
z_3<-matrix(1,nrow=500,ncol=15000)
for(i in 1:nrow(z_3)){
  for (j in 1:ncol(z_3)){
    if(i>N_3[j])z_3[i,j]<-0
  }
}
s_3<-chain3mcmc[20:519,]
s_3coordsX<-matrix(NA,nrow=nrow(s_3),ncol=ncol(s_3))
for(i in 1:nrow(s_3coordsX)){
  for (j in 1:ncol(s_3coordsX)){
    s_3coordsX[i,j]<-DensCov[s_3[i,j],2]
  }
}
s_3coordsY<-matrix(NA,nrow=nrow(s_3),ncol=ncol(s_3))
for(i in 1:nrow(s_3coordsY)){
  for (j in 1:ncol(s_3coordsY)){
    s_3coordsY[i,j]<-DensCov[s_3[i,j],2]
  }
}

s<-rbind(t(s_1),t(s_2),t(s_3))
z<-t(z)
EN<-s*z

X<-traplocs[,c(4,5)]
X[,1]<-(X[,1]/1000)
X[,2]<-(X[,2]/1000)

post<- matrix(0,nrow=45000,nrow(DensCov)+1)
dimnames(post)<-list(1:45000, c(0,(1:nrow(DensCov))))
for(i in 1:45000){
  xx<- table(EN[i,])
  idx<-names(xx)
  post[i,idx]<- xx
}
post<-post[,-1]
post.mean<- apply(post,2,mean)
post.sd<- sqrt(apply(post,2,var))

xg<-seq(min(Sgrid[,1]),max(Sgrid[,1]),length.out=51)
yg<-seq(min(Sgrid[,2]),max(Sgrid[,2]),length.out=51)
Sgrid<- as.matrix(expand.grid(xg,yg))

spatial.plot(Sgrid,post.mean,cx=3,col="terrrain.color")
spatial.plot(Sgrid,post.sd,cx=3,col="terrain.colors")
spatial.plot(Sgrid,log(post.sd/post.mean),cx=3,col="terrain.colors")
```

```
par(mfrow=c(2,2),mar=c(2,2,6,5))
library(raster)
plot(rasterFromXYZ(cbind(Sgrid,post.mean)))
title("Posterior Mean Density")
points(X,pch=20)

plot(rasterFromXYZ(cbind(Sgrid,log(post.sd/post.mean))))
title("Coefficient of Var. i.e., log(SD/mean)")
points(X,pch=20)
```

A1.3 Posterior distributions of population density, abundance, and parameters on population density and detection probability for the Full Model, for a study of black bears in southern New York in 2011 and 2012

Posterior estimates of population density, abundance, and parameters on population density and detection probability for the Full Model, for a study of black bears in southern New York in 2012.

Posterior estimates of model parameters for the Full Model, in a study of black bears in southern New York in 2012. Models were run with either Normal prior (0,0.1) or Uniform(-10,10) for the habitat covariates. We report the posterior mean, standard deviation (SD), naïve standard error (naïve se), the posterior 95%CI distribution, and the R-hat value for convergence across 3 chains of 15,000 iterations each. D is the number of bears/100 km^2, i.e., a population density; N is the number of estimated activity centers in the study area, i.e., abundance, sigma is the shape parameter that determines the shape of the decreasing detection probability related to distance, distinguishing between males (M) and females(F); exp(lam0) is the baseline detection probability; alpha is the behavioral response on detection probability, where exp(lam0+alpha) is the new detection probability, all else being constant; delta is the effect of gender on detection probability, where exp(lam0+delta) is the detection probability of males, all else being constant. Beta0 is the intercept of the intensity function for population density, while beta1-7 are coefficients for standardized covariates in the intensity function: beta1 for latitude; beta2 for percent forest landcover, beta3 for quadratic percent landcover, beta4 for agricultural landcover, beta5 for shrub and grassland cover; beta6 for road density, and beta7 for TPI. Beta8-12 are coefficients for standardized covariates on detection probability, where beta8-10 are for forest, agriculture, and grass/shrubland landcovers, beta11 is for road density and beta12 is for TPI. Table in a) shows the posteriors when normal priors were used for beta1-12; table in b) shows the posteriors when uniform priors were used for beta1-12.

a)

	mean	SD	naïve se	2.5	25	50	75	97.5	rhat
D	9.08E-02	9.85E-03	4.64E-05	0.07575	0.0838	0.08929	0.09624	0.11307	1.01
N	248.177	26.914	0.127	207.000	229.000	244.000	263.000	309.000	1.01
sigma_M	6.272	0.452	0.002	5.463	5.957	6.246	6.562	7.235	1.03
sigma_F	4.055	0.182	0.001	3.689	3.935	4.058	4.177	4.405	1.1
lam0	-2.970	0.165	0.001	-3.302	-3.080	-2.969	-2.857	-2.657	1.01
alpha	0.509	0.158	0.001	0.209	0.402	0.505	0.610	0.831	1
delta	-1.859	0.210	0.001	-2.273	-2.001	-1.859	-1.716	-1.448	1
beta 0	-3.542	0.527	0.002	-4.720	-3.872	-3.456	-3.146	-2.734	1.37
beta 1	-0.014	0.008	0.000	-0.028	-0.019	-0.014	-0.009	0.002	1.18

beta 2	5.013	1.480	0.007	2.071	4.087	4.949	5.976	7.792	1.44
beta 3	-2.397	1.098	0.005	-4.543	-3.207	-2.373	-1.584	-0.423	1.62
beta 4	1.304	1.191	0.006	-0.909	0.437	1.246	2.202	3.697	1.14
beta 5	-0.538	0.477	0.002	-1.637	-0.815	-0.498	-0.214	0.286	1.1
beta 6	0.078	0.251	0.001	-0.472	-0.075	0.103	0.254	0.511	1.13
beta 7	-1.191	1.168	0.006	-3.494	-1.959	-1.217	-0.432	1.283	1.22
beta 8	0.403	0.281	0.001	-0.142	0.217	0.403	0.586	0.961	1.02
beta 9	0.259	0.278	0.001	-0.280	0.075	0.259	0.440	0.812	1.03
beta 10	-0.522	1.979	0.009	-4.400	-1.887	-0.459	0.909	3.125	1.25
beta 11	0.384	1.982	0.009	-3.253	-1.050	0.317	1.753	4.277	1.25
beta 12	0.249	0.145	0.001	-0.035	0.152	0.249	0.347	0.536	1.05

b)

	mean	**sd**	**naïve se**	**2.5**	**25**	**50**	**75**	**97.5**	**rhat**
D	9.2E-02	1.1E-02	5.0E-05	7.6E-02	8.4E-02	9.0E-02	9.8E-02	1.2E-01	1.02
N	251.068	28.994	0.137	207.000	230.000	247.000	268.000	319.000	
sigma_M	6.244	0.453	0.002	5.427	5.929	6.220	6.528	7.202	1.01
sigma_F	4.107	0.262	0.001	3.658	3.921	4.087	4.274	4.682	1.77
loglam0	-2.995	0.187	0.001	-3.380	-3.120	-2.987	-2.863	-2.650	1.19
alpha	0.516	0.164	0.001	0.216	0.400	0.509	0.626	0.854	1.01
delta	-1.832	0.214	0.001	-2.246	-1.976	-1.833	-1.689	-1.409	1.08
beta 0	-3.826	0.898	0.004	-5.426	-4.580	-3.838	-2.988	-2.441	2.97
beta 1	-0.012	0.009	0.000	-0.029	-0.018	-0.012	-0.006	0.007	1.26
beta 2	5.114	3.645	0.017	-0.780	1.455	6.039	8.507	9.880	5.38
beta 3	-2.502	2.666	0.013	-6.407	-4.888	-3.072	-0.027	2.362	3.98
beta 4	1.365	1.081	0.005	-0.361	0.578	1.184	2.064	3.670	1.31
beta 5	-0.624	0.660	0.003	-2.748	-0.858	-0.532	-0.242	0.299	1.09
beta 6	0.038	0.278	0.001	-0.504	-0.156	0.033	0.234	0.564	1.32
beta 7	-1.503	1.964	0.009	-4.727	-3.144	-1.668	0.111	2.115	3.16
beta 8	0.375	0.295	0.001	-0.179	0.174	0.367	0.565	0.986	1.06

beta 9	0.220	0.291	0.001	-0.335	0.025	0.213	0.405	0.821	1.04
beta 10	-3.176	4.071	0.019	-9.657	-6.207	-3.954	0.372	4.403	2.47
beta 11	3.036	4.073	0.019	-4.542	-0.508	3.825	6.058	9.539	2.48
beta 12	0.264	0.148	0.001	-0.027	0.164	0.264	0.364	0.554	1.05

Posterior estimates of population density, abundance, and parameters on population density and detection probability for the Full Model, for a study of black bears in southern New York in 2011.

Posterior estimates of model parameters for the Full Model, in a study of black bears in southern New York in 2011. Models were run with either Normal prior (0,0.1) or Uniform(-10,10) for the habitat covariates. We report the posterior mean, standard deviation (SD), naïve standard error (naïve se), the posterior 95%CI distribution, and the R-hat value for convergence across 3 chains of 15,000 iterations each. D is the number of bears/100 km^2, i.e., a population density; N is the number of estimated activity centers in the study area, i.e., abundance, sigma is the shape parameter that determines the shape of the decreasing detection probability related to distance, distinguishing between males (M) and females(F); exp(lam0) is the baseline detection probability; alpha is the behavioral response on detection probability, where exp(lam0+alpha) is the new detection probability, all else being constant; delta is the effect of gender on detection probability, where exp(lam0+delta) is the detection probability of males, all else being constant. Beta0 is the intercept of the intensity function for population density, while beta1-7 are coefficients for standardized covariates in the intensity function: beta1 for latitude; beta2 for percent forest landcover, beta3 for quadratic percent landcover, beta4 for agricultural landcover, beta5 for shrub and grassland cover; beta6 for road density, and beta7 for TPI. Beta8-12 are coefficients for standardized covariates on detection probability, where beta8-10 are for forest, agriculture, and grass/shrubland landcovers, beta11 is for road density and beta12 is for TPI. Table in a) shows the posteriors when normal priors were used for beta1-12; table in b) shows the posteriors when uniform priors were used for beta1-12.

a)

	mean	**sd**	**naïve se**	**2.5**	**25**	**50**	**75**	**97.5**	**rhat**
D	0.174	0.007	0.000	0.155	0.170	0.176	0.179	0.181	1.13
N	479.259	20.080	0.095	427.000	470.000	485.000	494.000	500.000	1.13
sigma_M	6.943	3.218	0.015	3.149	3.753	6.885	8.241	15.458	3.14
sigma_F	5.499	1.904	0.009	3.509	4.117	4.576	6.921	9.918	4.89
alpha	0.758	0.174	0.001	0.423	0.639	0.756	0.875	1.106	1.27
delta	-0.549	1.427	0.007	-2.619	-1.533	-1.109	0.962	2.060	6.7
loglam0	-4.712	0.616	0.003	-5.993	-5.189	-4.488	-4.245	-3.910	4.62
beta 0	-6.136	1.857	0.009	-8.772	-8.187	-5.975	-4.711	-2.742	8.28

beta 1	-0.022	0.024	0.000	-0.065	-0.047	-0.012	-0.004	0.015	6.61
beta 2	0.163	3.095	0.015	-2.792	-2.226	-1.645	4.116	5.367	13.3
beta 3	1.608	1.326	0.006	-0.955	0.378	2.100	2.537	3.643	4.76
beta 4	2.406	1.891	0.009	0.613	1.057	1.411	4.628	5.737	9.88
beta 5	-2.122	3.255	0.015	-7.288	-5.145	-1.645	1.530	2.098	16.9
beta 6	-2.187	1.074	0.005	-3.433	-2.949	-2.547	-1.690	0.247	3.26
beta 7	0.581	0.770	0.004	-0.781	0.100	0.519	0.956	2.302	1.98
beta 8	0.891	0.354	0.002	0.221	0.649	0.881	1.121	1.616	1.08
beta 9	0.520	0.348	0.002	-0.144	0.280	0.512	0.750	1.229	1.1
beta 10	0.161	2.139	0.010	-5.108	-1.063	0.401	1.562	3.813	1.87
beta 11	0.141	2.138	0.010	-3.483	-1.254	-0.102	1.376	5.344	1.9
beta 12	0.083	0.197	0.001	-0.301	-0.051	0.082	0.214	0.473	1.06

b)

	mean	**sd**	**naïve se**	**2.5**	**25**	**50**	**75**	**97.5**	**rhat**
D	1.72E-01	8.68E-03	4.09E-05	0.1493	0.1674	0.1743	0.1783	0.1812	1.05
N	473.826	23.953	0.113	412.000	462.000	481.000	492.000	500.000	
sigma_M	7.166	3.890	0.018	2.953	3.666	6.580	7.978	16.205	6.81
sigma_F	5.199	1.645	0.008	3.005	3.944	4.515	6.730	8.581	4.62
alpha	0.859	0.166	0.001	0.525	0.749	0.861	0.972	1.177	1.09
delta	-0.656	1.479	0.007	-2.716	-1.806	-1.166	1.028	1.840	8.6
loglam0	-4.645	0.654	0.003	-5.886	-5.260	-4.467	-4.140	-3.648	3.94
beta 0	-4.721	1.516	0.007	-7.533	-5.668	-5.081	-3.199	-2.133	2.93
beta 1	-0.032	0.025	0.000	-0.067	-0.051	-0.041	-0.011	0.016	4.31
beta 2	-0.966	2.255	0.011	-4.466	-3.517	-0.284	0.684	2.695	6.62
beta 3	1.019	1.997	0.009	-1.367	-0.460	0.143	2.940	4.823	8.85
beta 4	0.331	0.906	0.004	-1.719	-0.163	0.513	0.977	1.532	1.77
beta 5	-0.930	2.094	0.010	-4.753	-3.539	0.323	0.667	0.980	9.27
beta 6	-1.225	1.307	0.006	-4.298	-1.124	-0.725	-0.401	0.059	6.72
beta 7	0.508	1.036	0.005	-1.968	0.053	0.759	1.192	2.004	1.12

beta 8	0.945	0.415	0.002	0.150	0.660	0.944	1.225	1.762	1.45
beta 9	0.680	0.465	0.002	-0.186	0.351	0.669	0.991	1.620	1.48
beta 10	-0.151	5.727	0.027	-9.252	-6.597	1.393	3.865	9.396	4.09
beta 11	0.398	5.794	0.027	-9.230	-3.669	-1.157	6.960	9.621	4.14
beta 12	0.140	0.232	0.001	-0.328	-0.015	0.145	0.300	0.578	1.31

A1.4 Top 20 models using the indicator variable approach on covariates on population density and detection probability for a study of black bears in southern New York in 2012 and 2011.

Top 20 models by posterior weight for habitat covariates on population density and detection probability for a black bear study in southern New York in 2012. A total of 2^12 (4,096) models were assessed. Cumulative posterior weight of the top models was 23.8%.

	2012 Models		Prior Weight	Posterior Weight
	Density	**Detection**		
1	Forest + Ag	Forest	0.0002	0.03
2	Forest	Forest + Ag	0.0002	0.028
3	Forest + Forest^2 + Ag	Shrub + Road	0.0005	0.015
4	Forest + Ag	Forest + Ag	0.0002	0.015
5	Forest + Ag + TPI	Forest	0.0002	0.014
6	Forest + Shrub	Forest	0.0002	0.012
7	Forest + Forest^2 + Ag + TPI	Forest	0.0005	0.011
8	Forest + Ag + Shrub + TPI	Forest	0.0002	0.011
9	Forest + Ag	Forest + Shrub + Road	0.0002	0.011
10	Forest + Ag	Forest + TPI	0.0002	0.01
11	Forest + Ag	Shrub + Road	0.0002	0.01
12	Forest + Ag + TPI	Shrub + Road	0.0002	0.01
13	Forest + Ag		0.0002	0.009
14	Forest + Forest^2 + Shrub	Road	0.0005	0.009
15	Forest + Ag + TPI	Forest + Ag	0.0002	0.009
16	Forest + Forest^2 + Ag + TPI	Shrub + Road	0.0005	0.008
17	Forest + Ag	Forest + Shrub	0.0002	0.008
18	Forest + Ag + TPI	Forest + Shrub + Road	0.0002	0.007
19	Forest + Shrub	Forest + Ag	0.0005	0.007
20	Forest + TPI	Forest + Ag	0.0005	0.007

Top 20 models by posterior weight for habitat covariates on detection probability for a black bear study in southern New York in 2012. We conducted model selection only for habitat covariates on detection probability, so a total of 2^5 (32) models were assessed. Cumulative posterior weight of the top models was 98.1%.

	2012 Models		Prior Weight	Posterior Weight
	Density	**Detection**		
1	N/A	Forest	0.03125	0.253
2	N/A	Forest + Ag + Road	0.03125	0.132
3	N/A	Forest + Ag	0.03125	0.092
4	N/A	Forest + Ag + Shrub + Road	0.03125	0.091
5	N/A	Forest + Ag + Shrub	0.03125	0.089
6	N/A	Ag	0.03125	0.078
7	N/A	Forest + Road	0.03125	0.054
8	N/A	TPI	0.03125	0.040
9	N/A	Forest + Shrub	0.03125	0.035
10	N/A	Forest + TPI	0.03125	0.032
11	N/A	Road	0.03125	0.017
12	N/A	Forest + Shrub + Road	0.03125	0.012
13	N/A	Shrub	0.03125	0.011
14	N/A	Ag + TPI	0.03125	0.011
15	N/A	Forest + Ag + TPI	0.03125	0.007
16	N/A	Shrub + Road	0.03125	0.007
17	N/A	Forest + Ag + Shrub + Road + TPI	0.03125	0.006
18	N/A	Forest + Ag + Road + TPI	0.03125	0.006
19	N/A	Forest + Ag + Shrub + TPI	0.03125	0.006
20	N/A	Forest	0.03125	0.005

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CHAPTER 2

Trap Configuration and Spacing Influences Parameter Estimates in Spatial Capture Recapture Models[1]

Introduction

Estimating population parameters such as abundance and density is crucial for understanding, managing, and conserving animal populations. Capture-mark-recapture (CMR) methods are a well-established approach in which repeated sampling with replacement of a population provides information about detection probabilities of individuals. CMR models have become increasingly realistic by addressing assumptions about population closure and capture probability [1– 4], including the recent developments of spatial capture-recapture (SCR) models. SCR models incorporate the geographic locations where individuals are detected, thereby explicitly accounting for unequal detection probabilities among individuals due to their unique spatial locations relative to sampling devices (traps, snares, etc.) [5, 6]. Unequal exposure of individuals to the sampling array occurs when, for example, some individuals have home ranges at the edge of the sampling array while others are located more centrally and therefore are always exposed to the sampling array [2,4,7,8]. As a result, non-spatial capture-recapture methods estimate population size, but require various ad-hoc approaches to convert estimates of population size to estimates of density. Non-spatial approaches attempt to homogenize the unequal trap exposure with methods such as minimizing the ratio of edge to area of the sampling grid [9], or by adding a buffer strip around the

[1]Sun, C., A.K. Fuller, and J. A. Royle. 2014. Trap Configuration and Spacing Influences Parameter Estimates in Spatial Capture Recapture Models. PLoS ONE 9(2): e88025. doi:10.1371/journal.pone.0088025, with slight modifications. The way we originally described trap spacing for the regular trap arrangement was incorrect. It was described as distance to the closest neighbor. Also, the simulations for J=32 in the regular trap configuration have been rerun and are reflected in the chapter. MNB values have also been corrected. These changes and corrections will be submitted as part of an erratum to the publication.

sampling array to account for movements of 'edge' individuals [10–13]. Conversely, SCR models directly estimate both population size and density; SCR models allow for individual-specific detection probabilities by accounting for the spatial organization of traps and by estimating the activity centers of individuals. SCR models are thus liberated from the assumption of geographic closure.

Two primary considerations of mark-recapture sampling design are the spatial extent of the trap array and the spacing between traps. An advantage of a large spatial extent is that it helps increase the expected number of unique individuals detected. For non-spatial approaches, Bondrup-Nielson [9] suggested that the spatial extent of a study area be at least four times the home range size of an individual. Large spatial extents also aim to capture the full range of movement of individuals and homogenize unequal detection rates among individuals [9,14,15]. Simultaneously, trap spacing influences rates of detection and recaptures: trap configurations with "holes", or traps that are too widely spaced relative to ranges of individual movement, can lead to individuals not being detected [12,16] as well as fewer recaptures of individuals at different traps (i.e., spatial recaptures), which are important for estimating home range sizes and movement ranges[15]. As a result, recommendations have been made to set at least four traps in each potential non-overlapping home range [17]. With a constant number of traps due to logistical or monetary considerations, a sampling trade-off occurs between spatial extent and trap spacing.

Few simulation-based studies have been conducted on the influence of sampling design on SCR parameter estimates [15,18,19]. SCR approaches can theoretically accommodate different spatial arrangements of traps because trap locations are a formal part of the model [5] describing the probability of encounter of individuals. However, spatial organization of the trapping array is still an important consideration. Large numbers of encountered individuals (sample size *n)* and recaptures are necessary to estimate population parameters with accuracy and precision, and trap arrangements need to be at spatial densities and scales that permit detection of individual movement [15]. Much of the early research on sampling design was conducted in small mammal community assemblages [20-22], and design recommendations based on small mammal populations may be hard to meet and are sometimes inappropriate for large-mammal systems [12,19]. Recent work has focused specifically on sampling designs for large-mammal populations with large home ranges and ranges of movement [15,16,23,24], but the body of published research remains scant. Notably, Sollmann et al. [15] demonstrated with simulations and a study of a Michigan black bear population that previously recommended spatial extents of at least 4x the home range size of individuals may be unnecessary. The authors showed that spatial extents smaller than an average male home range and only 1.5x larger than a female's yielded parameter estimates similar to when the full spatial extent was used. The authors cautioned that the range of movement over the sampling array is important for SCR models, and that the SCR model performed well as long as the spatial scale parameter sigma (σ) was at least half the average trap spacing. This sigma parameter describes the spatial scale over which an individual is detected, and can be converted to an estimate of the 95% home range radius [14]. The authors concluded that SCR models are able to accurately and precisely estimate population parameters for a range of sampling array extents, but that more research is necessary to explore the limits of SCR abilities with respect to trap configuration and extreme sampling designs.

Understanding the implications of different sampling designs is crucial, especially given the amount of effort required in large mammal mark-recapture studies and the increasing application of SCR methods. Moreover, in sampling over large landscapes, it is often not possible to achieve regular coverage of the landscape with traps that are close enough together to yield sufficient data for effective parameter estimation. Therefore, strategies for distributing traps over the landscape in an efficient manner must be developed and evaluated.

Our first objective was to improve understanding of sampling design with respect to SCR methods. We conducted simulations to investigate the effects of different trap configurations and spacings that would be feasible in large-mammal studies. First, we evaluated potential differences among three common trap configurations: regular spacing, clustered, and a temporal sequence of different clustered configurations (i.e., trap relocation) [25]. The regular trap configuration, in which traps are set systematically across the spatial extent, served as a baseline for comparison. The clustered configuration maintained spatially representative sampling over the entire spatial extent while providing more information on the spatial scale of detection and individual movement [17,19]. The third configuration evaluated was a clustered configuration with trap relocation midway through sampling; trap relocation is a common sampling approach to increase detection probability, more thoroughly sample large study areas, and avoid trap habituation and behavioral response [26]. Our second objective was to identify consequences of trap spacing for a fixed study area by decreasing the number of traps while maintaining the same spatial extent of the sampling array. We conducted our simulation study using sampling design considerations for American black bear (*Ursus americanus*), but the results are generalizable to any wide-ranging animal population to which SCR models might be applicable.

Methods

We based simulation conditions on characteristics of a black bear population study conducted in southwestern New York, USA. The simulated study area was a 2,624 km^2 square centered on a 4,100 km^2 landscape. To determine trap placement in the clustered and sequential trap configurations, we overlaid a grid of 64, non-overlapping, potential home ranges of 41km^2 each, based on the average female home range size estimated in northwestern Pennsylvania [27] (Figure 2.1).

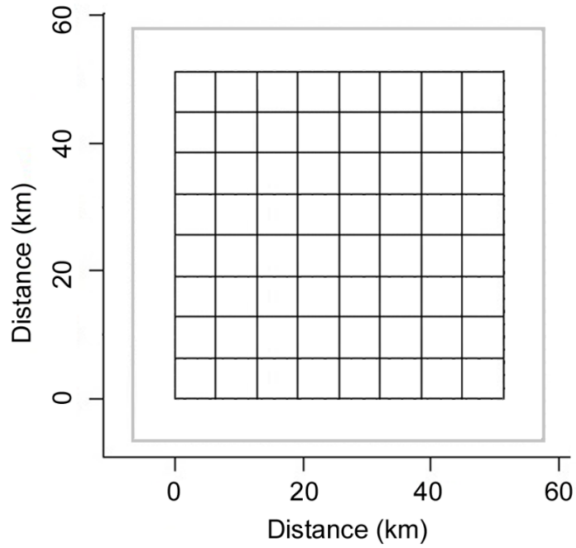

Figure 2.1. Schematic representation of study area. A representation of the 2,264 km^2 study area, divided into a grid of 64 cells of 41 km^2 each, and set in the center of a 4,100km^2 landscape, which is outlined in gray.

SCR model formulation and implementation

We used a binomial model for detection to create encounter histories for individuals. For sampling over K sampling periods, the number of encounters for an individual, i, in each of $j=1,\ldots, J$ traps, y_{ij}, has a binomial distribution with a parameter for encounter probability, p_{ij}. In other words:

$$y_{ij} \sim Binom(K, p_{ij})$$

For the individual and trap-specific encounter probability, p_{ij}, we used the half-normal model [28], which depends on the baseline detection probability

$$p_0 = \frac{e^{\alpha_0}}{1 + e^{\alpha_0}}$$

and a function of the Euclidean distance, D_{ij}, between individual, i, and trap , j, such that

$$p_{ij} = p_0 * e^{\frac{-D_{ij}^2}{2\sigma^2}}$$

, where σ is a spatial scale parameter determining the rate of decrease in encounter probability as a function of distance to trap D_{ij}. Most models for encounter probability have one or more parameters that are related to home range size and movement rates of individuals about their home range. For example, the half-normal model above can be interpreted as implying a bivariate normal model for movement, where $\sigma * \sqrt{5.99}$ is the 95% home range radius [14]. Detection of an individual at multiple traps provides information on σ, so we use the term "spatial captures" to refer to the number of unique traps at which an individual was detected or captured.

We simulated SCR data for a population size of N=500 over K=10 sampling occasions. We distributed individuals over the 4,100 km^2 landscape according to a random, uniform distribution, allowing for overlapping home ranges. This translates to a black bear density of 12.2 bears/ 100km^2, which is in the middle range of bear densities across the United States (Snowy Range of southeast Wyoming = 2.54 bears/100 km^2) [29], central Appalachian Mountains in Kentucky = 8 bears/100 km^2 [30], northern New York =20 bears/100km^2 [8], north-central Pennsylvania = 23 bears/100 km^2 [27], and Great Smoky Mountains, Tennessee ≥ 29 bears/ 100 km^2 [31]. We created nine detection scenarios by varying the spatial scale parameter, σ, and the baseline detection probability, p_0 (Figure 2.2). We used three values of σ (1, 5, and 10 km) to model a range of representative home range sizes, spanning estimates of female and male home ranges typical of bears in the northeastern United States [8,27,32, 33]. We used three values of p_0 (0.05, 0.10, and 0.20) to explore a realistic range for mark-recapture studies. The upper limit, p_0 = 0.20 (i.e., 20%), is the minimum suggested detection probability in non-spatial mark-recapture studies [34, 35], but lower

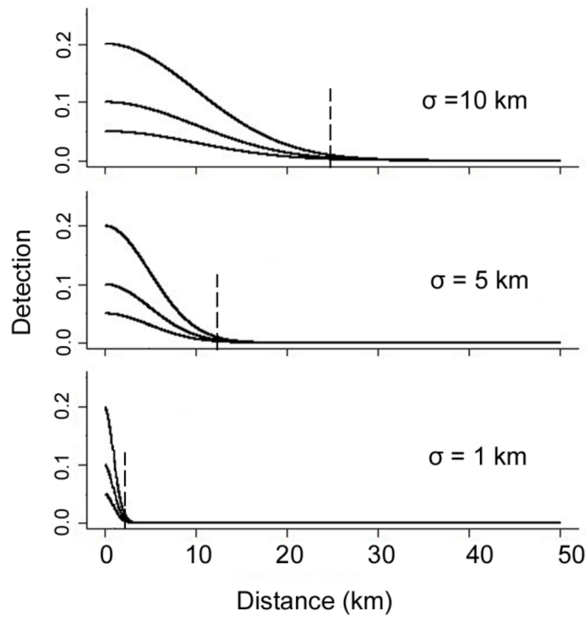

Figure 2.2. Nine detection scenarios by varying σ and p. Nine detection scenarios for N=500 were created by evaluating three values of the spatial scale parameter (σ = 10, 5, and 1 km), for each of three baseline detection rates, (p_0 = 0.20, 0.10, 0.05). As distance from an individual's activity center increases, p_0 decreases according to a half-normal function based on the two parameters. Dashed vertical lines indicate 95% home range radii ($\sigma * \sqrt{5.99}$).

probabilities have been found to be sufficient for populations larger than N>200 [31], so we also included lower detection probabilities.

Assessing sampling design and trap spacing

To evaluate the effect of sampling design on SCR parameter estimation, we applied three trap configurations: 1) regularly distributed across the study area, 2) grouped into clusters of 4 in every other non-overlapping female home range and, 3) traps relocated from one clustered configuration halfway through the sampling period to a second clustered configuration (Figure 2.3).

To evaluate trap spacing over the study area, we increased trap spacing from 4.7 km to 9.6 km by decreasing the number of traps from J=128 traps to 96, 64, and 32 traps over the same spatial extent in the regular trap configuration (Table 2.1, Figure 2.4). This also resulted in different effective trap spacings (i.e., trap spacings relative to each value of σ) ranging from 0.47σ, when σ = 10 km, to 14.94σ when σ = 1 km (Table 2.2). Decreasing the number of traps resulted in a trap density of 0.049/km^2 with 128 traps, 0.037/km^2 with 96 traps, 0.024/km^2 with 64 traps, and 0.012/km^2 with 32 traps. The upper limit of 128 traps represents what could be realistically employed over such a large study area given a sampling frequency of once per week assuming two field teams, while also maintaining a minimum of 4 trap sites per estimated female home range. However, even this upper bound of trap density falls severely short of suggestions for black bear studies of 0.17-0.50/km^2 [29].

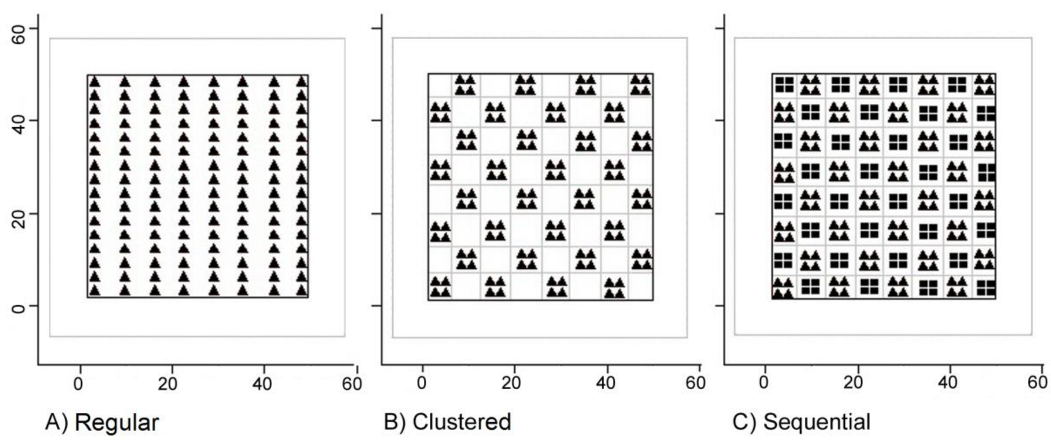

Figure 2.3 Three trap configurations: regular, clustered, and sequential. Three trap configurations were evaluated, shown with J=128 traps: (A) regular array, (B), clustered, and (C), a temporal sequence in which clustered traps of one arrangement (e.g. triangle) are moved halfway through the sampling period to new grids (e.g. squares).

Table 2.1. Trap spacing (km) for each combination of trap configuration (regular, clustered, and sequential) and number of traps (J=128, 96, 64, and 32.)**.** Trap spacing (km) in the regular trap configuration was varied by decreasing the number of traps in the study area. Trap spacing did not vary when traps were in the cluster or sequential configurations because reductions only decreased the number of traps per cluster.

	Number of traps, J			
	128	96	64	32
Regular	4.71	5.24	6.40	14.94
Clustered	9.06	9.06	9.06	N/A
Sequential	9.06	9.06	9.06	9.06

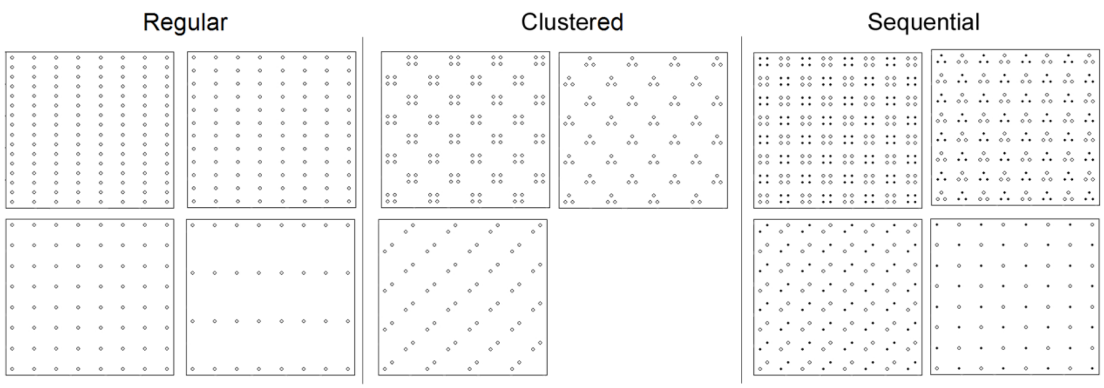

Figure 2.4. Trap configuration and number of traps generated eleven designs. Eleven trap designs were evaluated by varying the regular, clustered, and sequential trap arrangements for J=129, 96, and 64 traps. Only the regular and sequential trap arrangements were evaluated for J=32 traps since the clustered arrangement with one trap per cluster was equivalent to the regular arrangement. Trap spacing did not change when traps were in the clustered and sequential arrangements

Table 2.211. Effective trap spacings for each σ, scaled by dividing trap spacings (4.71, 5.24, 6.40, and 14.94 km) by σ (1, 5, and 10 km). For example, a trap spacing of 4.71 km equals 4.71σ when σ=1 km but only 0.47σ when σ = 10 km. Trap spacing of 14.94 km was not evaluated for the clustered trap configuration because it employs J=32 traps and therefore is equivalent to the regular trap spacing.

	σ = 1 km Trap spacing (km)				σ = 5 km Trap spacing (km)				σ = 10 km Trap spacing (km)			
	4.71	5.24	6.4	14.94	4.71	5.24	6.4	14.9	4.71	5.24	6.4	14.9
Regular	4.71	5.24	6.4	14.94	0.94	1.05	1.28	2.99	0.47	0.52	0.64	1.49
Clustered	9.06	9.06	9.1	N/A	1.81	1.81	1.81	N/A	0.91	0.91	0.91	N/A
Sequential	9.06	9.06	9.1	9.06	1.81	1.81	1.81	1.81	0.91	0.91	0.91	0.91

We decreased the number of traps for the clustered and sequential trap configurations, although this did not change trap spacing. We calculated trap spacing as the average distance from a center to its 4 closest neighbors for the regular trap configuration[2], and the distance between the centroids of a cluster and the next cluster for the clustered and sequential trap configurations. We did not consider the clustered trap configuration when J=32 since clusters would have consisted of only 1 trap and therefore be equivalent to the regular configuration.

For each of the nine detection scenarios (p_0 *x* σ), we generated 500 simulated encounter histories for each combination of trap configuration (n = 3) and trap spacing (n = 4). To estimate abundance, *N,* and the spatial scale parameter, *σ,* we used a maximum likelihood approach [36,37]. We conducted the simulations using Program R [38] and custom-written scripts (Appendix 2.1) with package 'snowfall' and 'rlecuyer' [39, 40]. Estimates of N and *σ* were compared to the simulated truth. We used estimated means, standard deviations, ranges, root mean squared error (RMSE), and mean normalized bias (MNB) to evaluate the effects of trap configuration and spacing.

[2] The traps in the regular configuration when J=128, 96, and 32 were not equidistant in the X and Y directions because the same study area size was maintained across all trap configurations.

Results

Trap configurations

The clustered trap configuration generally resulted in the most accurate estimators of abundance, $\hat{N}$. The clustered trap configuration yielded the lowest RMSEs in 8 of 9 combinations of p_0 (3 cases) and σ (3 cases), i.e., with the exception of σ = 5km and p_0=0.20 in which the sequential trap configuration resulted in the most accurate $\hat{N}$ (Table 2.3). The three trap configurations resulted in similarly unbiased estimators of $\hat{N}$ when effective trap spacing was <4.71σ, i.e., when σ > 1 km. But when effective trap spacing ≥ 4.71σ (σ = 1 km), the clustered and sequential trap configurations resulted in the lowest MNBs when detection was p_0=0.20 and 0.10.

As the number of detected individuals and captures per individual increased because of closer effective trap spacings, estimators of $\hat{N}$ improved (Appendix 2.3). For example, consider the clustered trap configuration when p_0=0.05: when effective trap spacing decreased from 14.94σ to 0.91σ due to an increase in the fixed, biologically-determined σ from 1 km to 10 km, the number of detected individuals increased from 38 individuals with fewer than 2 spatial recaptures to >490 individuals (>98% of total population N=500) with 7.8 spatial recaptures (Appendix 2.3). When effective trap spacing was ≥ 4.71σ (i.e., when σ ≥ 1 km), the sparse datasets, especially low rates of spatial recaptures, resulted in unstable maximum likelihood estimators (MLEs) and a strongly right-skewed sampling distribution of $\hat{N}$ (Table 2.3). Therefore, population size was consistently overestimated at all trap arrangements and detection rates. Standard deviations (SD) and root mean square errors (RMSE) were both at least 12% (Table 2.3). However, when effective trap spacing was < 4.71σ (i.e., when σ ≥ 5km), the mean $\hat{N}$ for all trap configurations at all detection probabilities were within one individual of the true N=500, and SD and RMSE no more than 3% (Table 2.3).

Table 12. Summary estimates of $\hat{N}$ when true population size N=500 and J=128 traps, under the three trap arrangements: regular, clustered, and sequential. For each scenario (*p x σ x configuration)*, mean, standard deviation (SD), range, root mean squared error (RMSE), and mean normalized bias (MNB) are given. Estimates are averages of 500 simulations, except when σ = 1 and p_0=0.05 (italics): 4, 2, and 7 iterations were discarded in the regular, clustered, and sequential configurations, respectively.

	σ = 1 km						σ = 5 km					
	Mean	SD	Min	Max	RMSE	MNB	Mean	SD	Min	Max	RMSE	MNB
p_0=0.20												
Regular	508.98	75.11	323.67	843.70	75.57	-0.30	499.87	6.38	482.04	518.28	6.38	-0.04
Clustered	503.44	60.76	344.83	683.63	60.80	-0.78	499.34	5.90	479.97	516.11	5.93	-0.15
Sequential	508.41	65.73	327.96	769.65	66.20	-0.01	499.76	5.58	479.20	514.08	5.58	-0.06
p_0=0.10												
Regular	546.75	177.91	240.40	1695.97	183.78	0.75	499.66	9.41	471.52	525.54	9.41	-0.10
Clustered	513.15	112.93	293.29	1168.27	113.58	-1.94	499.68	8.54	471.34	523.31	8.53	-0.09
Sequential	541.58	143.16	235.98	1164.94	148.94	1.68	499.67	8.81	472.31	524.92	8.81	-0.10
p_0=0.05												
Regular	*684.95*	*473.02*	*168.47*	*3735.46*	*506.93*	*2.11*	499.22	14.07	454.32	538.29	14.08	-0.24
Clustered	*572.24*	*354.12*	*156.14*	*4561.56*	*361.06*	*-8.45*	499.94	13.83	447.08	541.04	13.81	-0.09
Sequential	*665.46*	*443.15*	*126.44*	*3649.35*	*472.61*	*-2.39*	500.60	13.97	448.97	537.92	13.97	0.04

Table 2.3. (Continued)

	σ = 10 km					
	Mean	SD	Min	Max	RMSE	MNB
p_0=0.20						
Regular	499.91	0.30	498.00	500.00	0.31	-0.02
Clustered	499.96	0.20	499.00	500.00	0.20	-0.01
Sequential	499.94	0.23	499.00	500.00	0.24	-0.01
p_0=0.10						
Regular	499.62	1.07	495.75	501.09	1.14	-0.08
Clustered	499.50	1.02	495.33	500.67	1.13	-0.10
Sequential	499.44	0.99	496.24	500.62	1.14	-0.11
p_0=0.05						
Regular	499.62	3.02	491.31	507.18	3.04	-0.08
Clustered	499.66	2.92	489.95	505.87	2.94	-0.07
Sequential	499.26	3.04	482.35	506.26	3.12	-0.15

Estimators of $\hat{\sigma}$ performed similarly well across the three trap configurations (Table 2.4). However, precision of the estimators increased when the effective trap spacing increased with larger values of σ. Comparing estimators across regular, clustered, and sequential trap configurations when effective trap spacings were ≥4.71σ and ≤ 0.91σ (i.e., σ =1 km versus σ =10 km), SD decreased from a maximum of 28% to 1.1%).

Table 13. Summary estimates of $\hat{\sigma}$ when the true population size N=500 and J=128 traps, under the three trap arrangements: regular, clustered, and sequential. For each scenario (*p x σ x configuration)*, mean, standard deviation (SD), range, root mean squared error (RMSE), and mean normalized bias (MNB) are given. Estimates are averages of 500 simulations, except when σ = 1 and p_0=0.05 (italics): 4, 2, and 7 iterations were discarded in the Regular, Clustered, and Sequential configurations, respectively

	σ = 1 km						σ = 5 km					
	Mean	SD	Min	Max	RMSE	MNB	Mean	SD	Min	Max	RMSE	MNB
p_0=0.20												
Regular	1.00	0.07	0.80	1.22	0.07	-0.15	5.00	0.04	4.89	5.16	0.04	-0.05
Clustered	1.00	0.07	0.81	1.27	0.07	-0.49	5.00	0.04	4.85	5.11	0.04	-0.08
Sequential	1.00	0.08	0.76	1.25	0.08	-0.75	5.00	0.04	4.87	5.13	0.04	-0.03
p_0=0.10												
Regular	1.00	0.13	0.57	1.41	0.13	-1.74	5.00	0.06	4.86	5.31	0.06	0.00
Clustered	1.01	0.14	0.63	1.52	0.15	-0.76	5.00	0.07	4.77	5.22	0.07	-0.08
Sequential	0.99	0.14	0.67	1.45	0.14	-2.83	5.00	0.07	4.83	5.20	0.07	-0.04
p_0=0.05												
Regular	*0.97*	*0.24*	*0.38*	*1.89*	*0.24*	*-9.99*	5.00	0.10	4.73	5.34	0.10	-0.04
Clustered	*1.06*	*0.28*	*0.59*	*1.98*	*0.28*	*-0.37*	4.99	0.10	4.66	5.47	0.10	-0.19
Sequential	*1.01*	*0.24*	*0.55*	*2.44*	*0.24*	*-5.00*	5.00	0.10	4.68	5.28	0.10	-0.08

Table 2.4 (Continued)

	σ = 10 km					
	Mean	SD	Min	Max	RMSE	MNB
p_0=0.20						
Regular	9.99	0.06	9.84	10.17	0.06	-0.06
Clustered	10.00	0.05	9.81	10.16	0.05	-0.03
Sequential	10.00	0.05	9.84	10.17	0.05	0.00
p_0=0.10						
Regular	9.99	0.08	9.74	10.24	0.08	-0.07
Clustered	10.00	0.08	9.74	10.21	0.08	-0.01
Sequential	10.00	0.07	9.80	10.26	0.07	0.02
p_0=0.05						
Regular	10.00	0.11	9.68	10.40	0.11	-0.04
Clustered	10.00	0.11	9.58	10.33	0.11	-0.04
Sequential	10.00	0.11	9.67	10.44	0.11	0.01

Trap spacings and traps per cluster

As trap spacing increased from 4.71 km to 14.94 km by reducing the number of traps (J=128 to 32 traps), effective trap spacing relative to σ increased (Table 2.2). Individuals were detected fewer times and with fewer spatial and non-spatial captures (Appendix 2.4). As a result, estimators of $\hat{N}$ and $\hat{\sigma}$ decreased in accuracy and precision as trap spacing increased and number of traps per cluster decreased (Table 2.5,6 and Appendix 2.5-9). For example, consider increased effective trap spacing from 4.71σ to 14.94σ (when σ = 1 km) at p_0=0.20: population size was increasingly overestimated as the number of detected individuals decreased 73% and the spatial captures decreased from 1.1 to 1.0 (Appendix 2.3). $\hat{N}$ increased from 509 to 637, RMSE increased from 15 to 84% (regular trap configuration, Table 2.5), and RMSE of $\hat{\sigma}$ increased from 7% to 24% (Table 2.6). In some cases, including all trap spacings and trap configurations when p_0=0.05, the number of detected individuals was as low as 10 individuals (2% of total population N=500) and some simulated datasets yielded only one capture for all detected individuals (Appendix 2.4). These sparse data sets caused the MLE to occur on the boundary of the parameter space, and simulated data sets for which this was the case were removed from the analysis. For example, 308 such cases were discarded under the sequential trap arrangement when p_0=0.05 (Appendix 2.5).

However, when effective trap spacing was ≤1.92σ (i.e., when σ = 5 and 10 km), the properties of the estimators $\hat{N}$ and $\hat{\sigma}$ became similar across trap spacing and number of traps per cluster (Appendix 2.6-10). Estimators also increased in precision and accuracy. When σ =10 km (p_0=0.20), even as effective trap spacing increased from 0.47σ to 0.91σ, the number of detected individuals did not drop below 490 (98% of the true population N=500,) until effective trap spacing increased to 1.49σ when p_0=0.10 and 0.52σ when p_0=0.05 (Appendix 2.4). As a result, estimators of $\hat{N}$ at all trap spacings were within 2 individuals of the true population ($\hat{N}$ =499.3 to 501.6) and RMSE was less than 1% (Appendix 2.7). Estimators of $\hat{\sigma}$ had RMSEs of less than 0.02% (Appendix 2.10).

Table 14. For σ = 1 km, summary estimates of $\hat{N}$ in the regular trap configuration when trap spacing increased from 4.71 to 14.94 km (J=128 to 32 traps) and N=500. For each scenario (*p x spacing)*, mean, standard deviation (SD), range, root mean squared error (RMSE), and mean normalized bias (MNB) are given. <500 iterations were used for the italicized estimates, due to instability of MLE with sparse datasets. At p_0=0.20 and trap spacing of 14.94 km, 499 iterations were used to calculate the mean estimate (1 iterations discarded).At p_0=0.10 and trap spacing of 14.94 km, 484 iterations were used to calculate the mean estimate (16 iterations discarded).At p_0=0.05, and trap spacings increasing from 4.71km to 14.94 km, 496,488,447, and 328 iterations were used to calculate mean estimates (4,12, 53, and 172 iterations discarded, respectively).

	Mean	SD	Min	Max	RMSE	MNB
p=0.20						
4.71	509.0	75.11	323.67	843.70	75.57	-0.30
5.24	551.5	159.24	269.62	1557.64	167.20	3.24
6.40	591.2	270.71	219.00	2111.45	285.41	-0.15
14.94	*637.5*	*398.27*	*119.66*	*2744.47*	*420.97*	*8.25*
p=0.10						
4.71	546.7	177.91	240.40	1695.97	183.78	0.75
5.24	654.3	318.63	222.92	2059.04	353.73	7.17
6.40	705.0	534.01	131.75	5726.33	571.49	-3.64
14.94	*832.4*	*694.59*	*103.01*	*5101.05*	*769.38*	*9.62*
p=0.05						
4.71	*684.9*	*473.02*	*168.47*	*3735.46*	*506.93*	*2.11*
5.24	*998.2*	*794.68*	*147.04*	*5527.40*	*913.49*	*-0.19*
6.40	*755.6*	*746.89*	*91.06*	*4637.26*	*788.63*	*25.49*
14.94	*660.1*	*627.9*	*53.96*	*3238*	*647.1*	*64.17*

Table 15. For σ = 1 km, summary estimates of $\hat{\sigma}$ in the regular trap configuration when trap spacing increased from 4.71 to 14.94 km (J=128 to 32 traps) and N=500. For each scenario (*p x spacing)*, mean, standard deviation (SD), range, root mean squared error (RMSE), and mean normalized bias (MNB) are given. <500 iterations were used for the italicized estimates, due to instability of MLE with sparse datasets. See Table 2.5 footnote for number of iterations used for the italicized estimates.

	Mean	SD	Min	Max	RMSE	MNB
p=0.20						
4.71	1.00	0.07	0.80	1.22	0.07	-0.15
5.24	0.98	0.10	0.57	1.30	0.10	-2.99
6.40	0.98	0.17	0.49	1.39	0.17	-5.28
14.94	*0.99*	*0.24*	*0.46*	*1.78*	*0.24*	*7.26*
p=0.10						
4.71	1.00	0.13	0.57	1.41	0.13	-1.74
5.24	0.96	0.19	0.50	1.76	0.20	-8.90
6.40	0.98	0.24	0.50	1.51	0.24	-8.70
14.94	*0.99*	*0.33*	*0.36*	*2.00*	*0.33*	*14.09*
p=0.05						
4.71	0.97	0.24	0.38	1.89	0.24	-9.99
5.24	*0.86*	*0.30*	*0.27*	*2.31*	*0.32*	*0.32*
6.40	*1.02*	*0.31*	*0.39*	*1.77*	*0.31*	*9.59*
14.94	*0.985*	*0.409*	*0.229*	*2.021*	*0.409*	*26.62*

Discussion

We demonstrated that the clustered trap configuration generally yielded the most accurate estimators of abundance, $\hat{N}$. The regular trap configuration never out-performed the clustered or sequential trap arrangements in precision of abundance estimates, and in fact often resulted in fewer detected individuals, fewer total captures, and fewer spatial recaptures. Consequently, clustered and sequential trap arrangements even with fewer traps yielded estimates of abundance that were as precise or more as the regular trap configuration. Performance differences between the three trap configurations were most marked when trap spacing was large relative to home range size (Table 2.7). However, performance differences between trap

Table 16. RMSE values of estimators of $\hat{N}$, as effective trap spacing (i.e., trap spacing/ σ) increased under the regular trap configuration and across all baseline detection probabilities (p_0=0.20, 0.10, 0.05). RMSE increased when trap spacing ~ >2σ.

	p_0		
Trap Spacing (σ)	0.2	0.1	0.05
0.47	0.3	1.1	3.0
0.52	0.6	1.9	4.3
0.64	1.1	2.8	6.4
1.49	2.2	5.7	12.2
0.94	6.4	9.4	14.1
1.05	7.3	10.7	17.5
1.28	8.8	13.3	23.8
2.99	12.6	24.2	49.9
4.71	75.6	183.8	506.9
5.24	167.2	353.7	913.5
6.40	285.4	571.5	788.6
14.94	421.0	769.4	686.40

configurations diminished as home range size increased. SCR models are flexible to estimate population parameters with accuracy and precision for sampling designs commonly employed in studies of wide-ranging species. However, effective estimation in SCR models depends on obtaining a sufficiently large sample size of unique individuals and spatial recaptures. Compared to the regular trap configuration, the clustered arrangement frequently yielded more total captures and spatial recaptures, and the sequential arrangement yielded more unique individuals

Although the sequential configuration detected more unique individuals by moving traps to new locations, the total number of recaptures was fewer compared to the clustered configuration because each trap was only available to detect individuals for half the sampling occasions. Also, as detection rates decreased, more traps per cluster were necessary to detect individuals and recaptures. The necessity of sufficient sample sizes of individuals and spatial recaptures was also highlighted by the instability of the MLE under low detection (particularly p_0=0.05) at small values of the spatial scale parameter (σ= 1 km), which resulted in parameter estimates on the boundary of the parameter space [41, 42].

Non-regular, and particularly the clustered, trap configurations helped compensate for sparse trap arrays. This suggests that precise estimates over a large study area are possible, even when limited by a sparse and widely-set trap array, by arranging traps in clusters. Clusters of traps increase the expected number of spatial recaptures of individuals while the large spatial extent increases the expected number of unique individuals detected.

Our simulations also suggest that it is important to prescribe trap spacing relative to home range sizes of individuals. As the spatial scale parameter, σ, increased, differences between the performance of SCR estimators with different trap configurations diminished. For example, at the smallest value of σ (1 km), trap spacing in the regular configuration with 128 traps was 4.71 km, or > 4σ; but as σ increased to 10 km, this same trap spacing equated to just 0.47σ (Table 2.2). As a result, differences between trap arrangements were negligible at σ=10 km, even at the lowest detection rate (p_0=0.05). When traps are widely spaced relative to σ, fewer captures and spatial recaptures are collected. Accordingly, parameter estimates improved markedly when σ increased from 1 km to 5 km and trap spacing decreased to less than ~2σ (Table 2.7). Home range diameters of black bears in the geographic region on which these simulations were based range from 5.1 – 25.1 km [27], coinciding with the value of σ when accuracy and precision of our parameter estimates improved. This pattern in trap spacing is similar to the conclusions of Sollmann et al. [15] that recommended trap distances be less than 2σ. Since σ is a spatial scale parameter related to an individual's home range radius, this essentially suggests that at least ~2 traps should be placed within an individual's home range, a minimum that is smaller than the traditional recommendation for trap density of 4 traps per home range [17]. In evaluating trap spacings and configurations over a range of values for σ, our simulations also demonstrate the importance of establishing a sampling design based on the smallest (usually the female) estimate of σ. Doing so helps ensure detection of all individuals, even those with larger ranges of movement.

In field studies, implementing the sequential trap configuration requires that twice the number of traps be set because traps are moved half-way through the sampling period. This increases the amount of associated work that setting traps entails. Our simulations suggested that the different trap configurations performed similarly when trap spacing was less than 2σ, even when the sequential trap configuration detected a greater number of unique individuals. Thus, clustered trap configurations and even regular trap configurations may be sufficient, and more intense sampling designs unnecessary, when trap spacings of less than 2σ can be achieved. However, if trap spacing is >2σ, such as when forced due to large spatial extents, non-regular trap arrangements should be favored in order to maintain the precision of estimators. Sampling frequency and the length of the sampling season are other aspects of sampling that could increase the detection probability of new individuals and the precision of estimates of the locations of activity centers. We did not consider these aspects, but they would be appropriate for future simulations and research. In this situation, our results suggest that the clustered design would likely be the most efficient to employ.

We identified several instances of tradeoff between precision (SD) and bias (MNB) in parameter estimation. However, values of RMSE, which incorporates bias and variance, were similar to the corresponding values of SD, and estimates of bias were low. Thus, any observed tradeoffs between precision and bias were not consequential.

Naturally, our simulations were not exhaustive of the parameter space. Particularly, we held the spatial extent constant to mimic conditions for a predetermined study area, and defined the upper bound of number of traps (J=128) based on limits we expect researchers would likely face. As a result, we did not explore trap clusters with

>4 traps, which would have allowed larger spatial extents by setting clusters farther apart than 9.06 km. Larger spatial extents allow for more individuals to be detected, and would be applicable for populations with lower densities and/or larger ranges of movement. At the same time, spatial extents smaller than examined here would provide further insight into the minimum requirements for robust parameter estimation. Such simulations that continue to investigate the balance between spatial extent and trap spacing would be valuable for future research.

Conclusion

Our simulations demonstrate that 1) gains in precision and accuracy of parameter estimates are related to both trap configuration and trap spacing, which is relative to the spatial scale parameter and home range size, and that 2) increased numbers of traps per cluster (at least up to four traps per cluster) improve precision. Our simulations reinforce the understanding that although different SCR sampling designs can provide accurate and precise estimators of population parameters, effective estimation requires datasets that include captures and spatial recaptures of a sufficient proportion of the population. These results highlight the importance of understanding the spatial characteristics of a study population, such as home range sizes of different portions of the population, spatial scales of movement, as well as information about the ability to detect individuals.

In developing sampling designs for spatial capture-recapture studies, our results suggest the following strategy for devising a sampling design: 1) determine the spatial extent of the study population, 2) determine the maximum trap spacing based on the minimum value of the spatial scale parameter, $2\sigma_{min}$, 3) if enough traps are available to space traps less than 2σ in a regular arrangement, do so, assuming it is practical to implement, 4) otherwise, consider traps in a clustered configuration with wider spacing between clusters, and more traps per cluster as expected detection rate decreases. With the increasing application of SCR methods and the effort required of mark-recapture efforts, it is important to understand the consequences of different sampling designs for large-mammal populations. Simulations provide an accessible opportunity to explore different sampling arrangements, allowing researchers to identify feasible designs that most efficiently utilize effort and resources.

APPENDIX 2

A2.1. R Code for simulations

```
###############
## functions ##
###############

# e2 dist:
e2dist <-
  function (x, y)
  {
    i <- sort(rep(1:nrow(y), nrow(x)))
    dvec <- sqrt((x[, 1] - y[i, 1])^2 + (x[, 2] - y[i, 2])^2)
    matrix(dvec, nrow = nrow(x), ncol = nrow(y), byrow = F)
  }

# intlik4
intlik4 <-
  function (start = NULL, y = y, K = NULL, delta = 0.3, X = traplocs,
            G = NULL, ssbuffer = 2)
  {
    if (is.null(G)) {
      Xl <- min(X[, 1]) - ssbuffer
      Xu <- max(X[, 1]) + ssbuffer
      Yu <- max(X[, 2]) + ssbuffer
      Yl <- min(X[, 2]) - ssbuffer
      SSarea <- (Xu - Xl) * (Yu - Yl)
      if (is.null(K))
        return("need sample size")
      xg <- seq(Xl + delta/2, Xu - delta/2, delta)
      yg <- seq(Yl + delta/2, Yu - delta/2, delta)
      npix.x <- length(xg)
      npix.y <- length(yg)
      area <- (Xu - Xl) * (Yu - Yl)/((npix.x) * (npix.y))
      G <- cbind(rep(xg, npix.y), sort(rep(yg, npix.x)))
    }
    else {
      G <- G
      SSarea <- nrow(G)
    }
    nG <- nrow(G)
    D <- e2dist(X, G)
    if (is.null(start))
      start <- c(0, 0, 0)
    alpha0 <- start[1]
    alpha1 <- exp(start[2])
    n0 <- exp(start[3])
    probcap <- plogis(alpha0) * exp(-alpha1 * D * D)
    Pm <- matrix(NA, nrow = nrow(probcap), ncol = ncol(probcap))
    ymat <- y
    ymat <- rbind(y, rep(0, ncol(y)))
    lik.marg <- rep(NA, nrow(ymat))
    for (i in 1:nrow(ymat)) {
      Pm[1:length(Pm)] <- (dbinom(rep(ymat[i, ], nG), rep(K, nG),
```

```
      probcap[1:length(Pm)], log = TRUE))
      # when traps are relocation in the sequential arrangement
      # Pm[1:length(Pm)] <- (dbinom(rep(ymat[i, ], nG), rep((K/2), nG),
      probcap[1:length(Pm)], log = TRUE))
      lik.cond <- exp(colSums(Pm))
      lik.marg[i] <- sum(lik.cond * (1/nG))
    }
    nv <- c(rep(1, length(lik.marg) - 1), n0)
    part1 <- lgamma(nrow(y) + n0 + 1) - lgamma(n0 + 1)
    part2 <- sum(nv * log(lik.marg))
    out <- -1 * (part1 + part2)
    attr(out, "SSarea") <- SSarea
    out
  }

################################
# Simulate some number of datasets #
################################

Qfnmulti<-function(X,G,alpha0,sigma){
  # Simulations
  wrapper<-function(a){
    nsim<-2
    sims.mat <- matrix(NA,nsim,4)
    colnames(sims.mat)<-c("alpha0","alpha1","N","Time")

    set.seed(1234)
    N <- 500 # N
    K <- 10   # occasions
    traplocs <-  X
    alpha0 <- alpha0
    sigma <- sigma
    for(sim in 1:nsim){
      pickS <- sample(1:nrow(G),N,replace=T)
      S <- G[pickS,]
      D <- e2dist(S, traplocs)
      ntraps <- nrow(traplocs)
      # with trap relocation in the sequential arrangement
      # traps_1<-traplocs[1:(nrow(traplocs)/2),] ; ntraps_1<-nrow(traps_1)
      # traps_2<-traplocs[((nrow(traplocs)/2)+1):ntraps,] ; ntraps_2<-
nrow(traps_2)
      beta <- 1/(2 * sigma * sigma)
      probcap <- plogis(alpha0) * exp(-beta * D * D)
      Y <- matrix(NA, nrow = N, ncol = ntraps)
      for (i in 1:nrow(Y)) {
        Y[i,] <- rbinom(ntraps, K, probcap[i,])
      }
      # with trap relocation in the sequential arrangement
      # for (i in 1:nrow(Y)) {
      #  Y[i,1:ntraps_1 ] <- rbinom(ntraps_1, K/2, probcap[i,1:ntraps_1 ])
      #  Y[i,(ntraps_1+1):ntraps ] <- rbinom(ntraps_2, K/2,
probcap[i,((ntraps_1)+1):ntraps])
      # }
      totalcaps <- apply(Y, 1, sum)
      Y <- Y[totalcaps > 0, ]
      dimnames(Y) <- list(1:nrow(Y), paste("trap", 1:ncol(Y), sep = ""))
      ninds<-nrow(Y)
```

```
      hols <- list(   Y = Y, traplocs = traplocs, N = N, alpha0 = alpha0,
            beta = beta, sigma = sigma, K = K, S = S)
      s3<-ifelse(is.infinite(log(N-nrow(Y))),log(100),log(N-nrow(Y)))
      starts<-c(alpha0,log(beta),s3)
      t <- system.time( out <- nlm(intlik, starts, hessian=TRUE, y=hols$Y,
                  K=hols$K, X=hols$traplocs, G = G))
      sims.mat[sim,] <-
c(out$estimate[1],out$estimate[2],nrow(hols$Y)+exp(out$estimate[3]),t[3])
    }
    return(sims.mat)
  }
# library("rlecuyer")
# library("snowfall')
 }
```

A2.2 Trap Configurations

```
##################
## trap designs ##
##################


#seq(0,8*sqrt(41),by=(8*sqrt(41)/24))
vals.a <-c(2.134375,4.268749,14.940623,17.074998,27.746872,
            29.881246,40.553120,42.687495)
vals.b <-c(8.537499,10.671874,21.343747,23.478122,34.149996,
            36.284371,46.956244,49.090619)

## Uniform 128
seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),by=sqrt(41))
x.val.1<- sort(rep(seq((sqrt(41)/2),(sqrt(41)*8)-
(sqrt(41)/2),by=sqrt(41)),16))
y.val.1<-rep(seq((8*sqrt(41))/17,8*sqrt(41)-
(8*sqrt(41)/17),by=8*sqrt(41)/17),8)
traplocs.128u<-cbind(x.val.1,y.val.1)
## Cluster1 for 128 traps
x.val.2a<-sort(rep(vals.a,8))
y.val.2a<-rep(vals.a,8)
traplocs.2a<-cbind(x.val.2a,y.val.2a)
x.val.2b<-sort(rep(vals.b,8))
y.val.2b<-rep(vals.b,8)
traplocs.2b<-cbind(x.val.2b,y.val.2b)
traplocs.128c<-rbind(traplocs.2a,traplocs.2b)
## Cluster2 for 128 traps
x.val.3a<-sort(rep(vals.b,8))
y.val.3a<-rep(vals.a,8)
traplocs.3a<-cbind(x.val.3a,y.val.3a)
x.val.3b<-sort(rep(vals.a,8))
y.val.3b<-rep(vals.b,8)
traplocs.3b<-cbind(x.val.3b,y.val.3b)
traplocs.128.3<-rbind(traplocs.3a,traplocs.3b)
## Seq traps for 128
traplocs.128s<-rbind(traplocs.128c,traplocs.128.3)
```

```
## Uniform 96
seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),by=sqrt(41))
x.val<- sort(rep(seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),by=sqrt(41)),12))
y.val<-rep(seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),by=((sqrt(41)*8)-
(sqrt(41)/2)-(sqrt(41)/2))/11),8)
traplocs.96u<-cbind(x.val,y.val)
## Array 1 for 96
x.val.96a<-
c(sort(rep(c(2.134375,4.268749,14.940623,17.074998,27.746872,29.881246,40.553
120,42.687495),4)),sort(rep(c(8.537499,10.671874,21.343747,23.478122,34.14999
6,36.284371,46.956244,49.090619),4)))
y.val.96a<-c(rep(c(2.134375,14.940623,27.746872,40.553120),8),
rep(c(8.537499,21.343747,34.149996,46.956244),8))
traplocs.96a<-cbind(x.val.96a,y.val.96a)
x.val.96b<-c(sort(rep(seq(8*sqrt(41)/16,8*sqrt(41)-
8*sqrt(41)/16,by=2*sqrt(41)),4)),sort(rep(seq(3*8*sqrt(41)/16,8*sqrt(41)-
8*sqrt(41)/16,by=2*sqrt(41)),4)))
y.val.96b<-
c(rep(c(4.268749,17.074998,29.881246,42.687495),4),rep(c(10.671874,23.478122,
36.284371,49.090619),4))
traplocs.96b<-cbind(x.val.96b,y.val.96b)
traplocs.96.1<-rbind(traplocs.96a,traplocs.96b)
traplocs.96c<-traplocs.96.1
## Array 2 for 96
x.val.96c<-
c(sort(rep(c(2.134375,4.268749,14.940623,17.074998,27.746872,29.881246,40.553
120,42.687495),4)),sort(rep(c(8.537499,10.671874,21.343747,23.478122,34.14999
6,36.284371,46.956244,49.090619),4)))
y.val.96c<-
c(rep(c(8.537499,21.343747,34.149996,46.956244),8),rep(c(2.134375,14.940623,2
7.746872,40.553120),8))
traplocs.96c<-cbind(x.val.96c,y.val.96c)
x.val.96d<-c(sort(rep(seq(8*sqrt(41)/16,8*sqrt(41)-
8*sqrt(41)/16,by=2*sqrt(41)),4)),sort(rep(seq(3*8*sqrt(41)/16,8*sqrt(41)-
8*sqrt(41)/16,by=2*sqrt(41)),4)))
y.val.96d<-
c(rep(c(10.671874,23.478122,36.284371,49.090619),4),rep(c(4.268749,17.074998,
29.881246,42.687495),4))
traplocs.96d<-cbind(x.val.96d,y.val.96d)
traplocs.96.2<-rbind(traplocs.96c,traplocs.96d)
## Seq  traps of 96
traplocs.96s<-rbind(traplocs.96.1,traplocs.96.2)


## Uniform 64
seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),by=sqrt(41))
x.val<- sort(rep(seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),by=sqrt(41)),8))
y.val<-rep(seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),by=sqrt(41)),8)
traplocs.64u<-cbind(x.val,y.val)
## Array 1 for 64  - essentially uniform on its side
x.val.64a<-
c(sort(rep(c(2.134375,4.268749,14.94062,17.075,27.74687,29.88125,40.55312,42.
6875),4)),sort(rep(c(8.537499,10.67187,21.34375,23.47812,34.15,36.28437,46.95
624,49.09062),4)))
y.val.64a<-
c(rep(c(2.134375,14.940623,27.746872,40.55312,4.268749,17.074998,29.881246,42
```

```
.687495),4),rep(c(8.537499,21.343747,34.149996,46.956244,10.671874,23.478122,
36.284371,49.090619),4))
traplocs.64.1<-cbind(x.val.64a,y.val.64a)
traplocs.64c<-traplocs.64.1
## Array 2 for 64 - essentially uniform on its side
x.val.64c<-
c(sort(rep(c(8.537499,10.671874,21.343747,23.478122,34.149996,36.284371,46.95
6244,49.090619),4)),sort(rep(c(2.134375,4.268749,14.940623,17.074998,27.74687
2,29.881246,40.55312,42.687495),4)))
y.val.64c<-
c(rep(c(2.134375,14.940623,27.746872,40.55312,4.268749,17.074998,29.881246,42
.687495),4),rep(c(8.537499,21.343747,34.149996,46.956244,10.671874,23.478122,
36.284371,49.090619),4))
traplocs.64.2<-cbind(x.val.64c,y.val.64c)
## Seq traps for 64
traplocs.64s<-rbind(traplocs.64.1,traplocs.64.2)


## Uniform 32
x.val<- sort(rep(seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),by=sqrt(41)),4))
y.val<-rep(seq((sqrt(41)/2),(sqrt(41)*8)-(sqrt(41)/2),length.out=4),8)
traplocs.32u<-cbind(x.val,y.val)
## Cluster1 for 32
x.val.a<-sort(rep(seq(sqrt(41)/2,(sqrt(41)*8)-(sqrt(41)),by=2*sqrt(41)),4))
y.val.a<-rep(seq(sqrt(41)/2,(sqrt(41)*8)-(sqrt(41)),by=2*sqrt(41)),4)
traplocs.1a<-cbind(x.val.a,y.val.a)
x.val.b<-sort(rep(seq(sqrt(41)+sqrt(41)/2,sqrt(41)*8-
sqrt(41)/2,by=2*sqrt(41)),4))
y.val.b<-rep(seq(sqrt(41)+sqrt(41)/2,sqrt(41)*8-sqrt(41)/2,by=2*sqrt(41)),4)
traplocs.1b<-cbind(x.val.b,y.val.b)
traplocs.32c<-rbind(traplocs.1a,traplocs.1b)
## Cluster2 for 32
x.val.a<-sort(rep(seq(sqrt(41)/2,(sqrt(41)*8)-(sqrt(41)),by=2*sqrt(41)),4))
y.val.a<-rep(seq(sqrt(41)+sqrt(41)/2,sqrt(41)*8-sqrt(41)/2,by=2*sqrt(41)),4)
traplocs.2a<-cbind(x.val.a,y.val.a)
x.val.b<-sort(rep(seq(sqrt(41)+sqrt(41)/2,sqrt(41)*8-
sqrt(41)/2,by=2*sqrt(41)),4))
y.val.b<-rep(seq(sqrt(41)/2,(sqrt(41)*8)-(sqrt(41)),by=2*sqrt(41)),4)
traplocs.2b<-cbind(x.val.b,y.val.b)
traplocs.32d<-rbind(traplocs.2a,traplocs.2b)
## Seq traps for 32
traplocs.32s<-rbind(traplocs.32c<-
rbind(traplocs.1a,traplocs.1b),traplocs.32d<-rbind(traplocs.2a,traplocs.2b))
```

A2.3. Summary of mean capture data across trap configuration, σ, and p_0 for N=500 and J=128 traps.

		σ = 1 km			σ = 5 km			σ = 10 km		
	Design	Inds	Caps	Spatial Caps	Inds	Caps	Spatial Caps	Inds	Caps	Spatial Caps
p_0=0.20										
	Regular	113.0	1.6	1.1	460.8	10.0	6.6	499.9	33.7	22.2
	Clustered	97.7	1.9	1.2	467.9	9.8	6.8	500.0	33.4	20.8
	Sequential	128.4	1.4	1.2	470.7	9.7	8.4	499.9	33.4	27.2
p_0=0.10										
	Regular	70.6	1.3	1.1	425.2	5.4	4.4	498.8	16.8	13.7
	Clustered	65.1	1.4	1.2	435.7	5.2	4.3	499.0	16.6	12.8
	Sequential	75.4	1.2	1.0	437.1	5.2	6.8	499.0	16.6	14.7
p_0=0.05										
	Regular	39.9	1.1	1.1	372.2	3.1	2.7	491.1	8.5	7.7
	Clustered	37.7	1.2	1.2	435.7	5.2	2.5	492.6	8.4	7.8
	Sequential	40.8	1.1	1.0	383.7	2.9	6.7	492.4	8.4	7.7

p_0 – baseline detection rate
Inds – average number of unique individuals detected
Caps – average number of total captures per individual
Spatial caps – average number of unique traps at which each individual was captured
Data are averages of 500 simulations.

A2.4. Summary of capture data across σ and p_0 when trap spacing increased (4.71, 5.24, 6.40, and 14.94 km) in the regular configuration.

	σ = 1 km			σ = 5 km			σ = 10 km		
	Inds	Caps	Spatial Caps	Inds	Caps	Spatial Caps	Inds	Caps	Spatial Caps
p=0.20									
4.71	113.0	1.6	1.1	460.8	10.0	6.6	499.9	33.7	22.2
5.24	89.0	1.6	1.0	450.1	7.6	5.3	499.7	25.2	17.1
6.4	60.8	1.5	1.0	435.9	5.3	3.7	499.1	16.7	11.3
14.94	30.9	1.51	1.0	400.7	2.85	2.1	495.6	8.2	5.6
p=0.10									
4.71	70.6	1.3	1.1	425.2	5.4	4.4	498.8	16.8	13.7
5.24	54.7	1.3	1.0	408.5	4.2	3.6	497.1	12.6	10.3
6.4	36.1	1.2	1.0	382.9	3.0	2.5	492.7	8.4	6.9
14.94	18.5	1.26	1.0	309.9	1.83	1.5	473.3	4.27	3.5
p=0.05									
4.71	39.9	1.1	1.1	372.2	3.1	2.7	491.1	8.5	7.7
5.24	30.8	1.1	1.0	344.4	2.5	2.3	483.8	6.5	5.9
6.4	20.2	1.1	1.0	299.4	1.9	1.7	466.8	4.4	4.1
14.94	10.1	1.1	1.0	204.6	1.38	1.3	409.6	2.46	2.3

Data are averages of 500 simulations.

A2.5. For σ = 1 km, summary of estimated $\hat{N}$ in the clustered and sequential trap configurations when trap spacing increased from 4.71 to 14.94 km (J=128 to 32 traps) and N=500.

	Clustered						Sequential					
	Mean	SD	Min	Max	RMSE	MNB	Mean	SD	Min	Max	RMSE	MNB
p=0.20												
4.71	503.4	60.8	344.8	683.6	60.8	-0.78	508.4	65.7	328	769.6	66.2	-0.01
5.24	508.5	89	273.1	835.3	89.35	-1.42	516	90.9	315.6	959.4	92.16	0.19
6.4	534.2	135.3	248	1124.3	139.43	0.54	553.6	167.2	268.7	1553.9	175.37	2.47
14.94	N/A						*676.1*	*480.7*	*127.2*	*4945.2*	*511.46*	*6.66*
p=0.10												
4.71	513.1	112.9	293.3	1168.3	113.58	-1.94	541.6	143.2	236	1164.9	148.94	1.68
5.24	527	156.6	202.4	1195.1	158.76	-3.51	581.7	246.5	242	1666.5	259.45	1.04
6.4	611.5	353.6	146	3938.6	370.39	-3.16	*816.1*	*664.9*	*160.6*	*5919.6*	*735.56*	*-10.42*
14.94	N/A						*755*	*735.9*	*78.5*	*7716.9*	*777.13*	*22.11*
p=0.05												
4.71	*572.2*	*354.1*	*156.1*	*4561.6*	*361.06*	*-8.45*	*665.5*	*443.1*	*126.4*	*3649.3*	*472.61*	*-2.39*
5.24	*606.6*	*476.9*	*113.9*	*4735.8*	*488.21*	*17.04*	*635.7*	*430.4*	*98*	*3709.7*	*450.85*	*9.99*
6.4	*705.2*	*575.5*	*67.8*	*3624.7*	*610.4*	*21.06*	*541.1*	*389.7*	*71.9*	*2832.3*	*391.3*	*50.23*
14.94	N/A						*416.9*	*357.5*	*19.1*	*1713.8*	*366.15*	*157.6*

Clustered trap configurations were not evaluated at 14.94 trap spacing (J=32 traps) as it was equivalent to a Regular trap configuration.
<500 iterations were used for the italicized estimates, due to instability of MLE with sparse datasets.
Under the Clustered trap configuration at p_0=0.05, and trap spacings increasing from 4.71 to 6.40km, 498, 494 and 466 iterations were used to calculate mean estimates (2,6, and 34 iterations discarded, respectively).
Under the Sequential trap configuration at p_0=0.20 and trap spacing of 14.94km, 499 iterations were used to calculate mean estimates (1 iteration discarded)
Under the Sequential trap configuration at p_0=0.10 and trap spacings of 6.40 and 14.94 km, 495 and 440 iterations were used to calculate mean estimates (5 and 60 iterations discarded, respectively).
Under the Sequential trap configuration at p_0=0. 50 and trap spacing increasing from 4.71km to 14.94 km, 493,457,330, and 192 iterations were used to calculate mean estimates (7, 43, 170, and 308 iterations discarded, respectively)

A2.6. For σ = 5 km, summary estimates of $\hat{N}$ in the regular, clustered, and sequential trap configurations when trap spacing increased from 4.71 to 14.94 km (J=128 to 32 traps) and N=500.

	Regular						Clustered					
	Mean	SD	Min	Max	RMSE	MNB	Mean	SD	Min	Max	RMSE	MNB
p=0.20												
4.71	499.9	6.4	482	518.3	6.38	-0.04	499.3	5.9	480.0	516.1	5.93	-0.15
5.24	499.7	7.3	477.3	520.8	7.25	-0.08	499.6	6.8	478.3	520.9	6.83	-0.09
6.4	499	8.8	471.8	523.1	8.82	-0.23	499.9	9.0	474.0	527.2	9.02	-0.06
14.94	499.9	12.6	467.4	546.9	12.63	-0.09	N/A					
p=0.10												
4.71	499.7	9.4	471.5	525.5	9.41	-0.1	499.7	8.5	471.3	523.3	8.53	-0.09
5.24	499.5	10.7	471.1	540.2	10.66	-0.15	499.9	10.4	467.3	529.7	10.37	-0.06
6.4	499.1	13.3	459.3	537.7	13.31	-0.25	499.9	13.1	463.5	532.6	13.10	-0.08
14.94	500.1	24.2	428.4	585.4	24.22	-0.21	N/A					
p=0.05												
4.71	499.2	14.1	454.3	538.3	14.08	-0.24	499.9	13.8	447.1	541.0	13.81	-0.09
5.24	499.2	17.5	443	549.7	17.48	-0.28	499.6	16.9	439.9	548.7	16.90	-0.20
6.4	500.4	23.8	433.6	589.1	23.81	-0.14	500.3	23.3	439.8	569.2	23.32	-0.16
14.94	504.1	49.8	378.2	740.3	49.9	-0.14	N/A					

A2.6 Continued

	Sequential					
	Mean	SD	Min	Max	RMSE	MNB
p=0.20						
4.71	499.8	5.6	479.2	514.1	5.58	-0.06
5.24	499.3	7.1	476.6	524.8	7.13	-0.15
6.4	499.3	8.8	465.5	525.8	8.83	-0.17
14.94	498.8	13.3	456.9	537.5	13.32	-0.32
p=0.10						
4.71	499.7	8.8	472.3	524.9	8.81	-0.1
5.24	499.5	10.6	459.4	527.4	10.56	-0.15
6.4	499.3	13	457.7	543.5	13.04	-0.22
14.94	499.7	23.6	435.7	605.5	23.54	-0.28
p=0.05						
4.71	500.6	14	449	537.9	13.97	0.04
5.24	499.1	16.9	444.5	555.2	16.93	-0.29
6.4	501.6	22.5	431.3	566.1	22.53	0.12
14.94	499.7	23.6	435.7	605.5	23.54	-0.28

Data are averages of 500 simulations. Clustered trap configurations were not evaluated at 14.94 trap spacing (J=32 traps) as it was equivalent to a regular trap configuration

A2.7. For σ = 10 km, summary estimates of $\hat{N}$ in the regular, clustered, and sequential trap configurations when trap spacing increased from 4.71 to 14.94 km (J=128 to 32 traps) and N=500.

	Regular						Clustered					
	Mean	SD	Min	Max	RMSE	MNB	Mean	SD	Min	Max	RMSE	MNB
p=0.20												
4.71	499.9	0.3	498	500	0.31	-0.02	500	0.2	499	500	0.2	-0.01
5.24	499.7	0.5	497	500	0.58	-0.05	499.8	0.5	498	500	0.54	-0.05
6.4	499.4	1	495.3	500.5	1.14	-0.12	499.4	1	495.3	500.6	1.15	-0.11
14.94	499.4	2.1	491.2	504.2	2.18	-0.12	N/A					
p=0.10												
4.71	499.6	1.1	495.8	501.1	1.14	-0.08	499.5	1	495.3	500.7	1.13	-0.1
5.24	499.5	1.8	492.3	503.1	1.91	-0.11	499.4	1.6	492.6	502.3	1.71	-0.13
6.4	499.5	2.7	491.2	506.2	2.78	-0.11	499.3	2.7	490.7	506.1	2.8	-0.14
14.94	499.3	5.6	480.1	517.5	5.67	-0.16	N/A					
p=0.05												
4.71	499.6	3	491.3	507.2	3.04	-0.08	499.7	2.9	490	505.9	2.94	-0.07
5.24	499.6	4.3	485.4	511.7	4.32	-0.08	499.5	3.8	487.8	508.5	3.79	-0.11
6.4	499.5	6.4	477.9	516.2	6.4	-0.11	499.6	6.2	480.7	517.5	6.21	-0.1
14.94	500.1	12.2	465.3	538.6	12.16	-0.05	N/A					

A2.7 Continued

	Sequential					
	Mean	SD	Min	Max	RMSE	MNB
p=0.20						
4.71	499.9	0.2	499	500	0.24	-0.01
5.24	499.8	0.5	498	500	0.5	-0.04
6.4	499.5	0.9	496.2	500.5	1.04	-0.11
14.94	499.3	2.7	492.1	506.5	2.75	-0.14
p=0.10						
4.71	499.4	1	496.2	500.6	1.14	-0.11
5.24	499.4	1.5	494.6	502.2	1.64	-0.11
6.4	499.5	2.7	490.8	506.3	2.78	-0.1
14.94	499	6.3	478.8	515.5	6.35	-0.22
p=0.05						
4.71	499.3	3	482.3	506.3	3.12	-0.15
5.24	499.5	3.9	485.7	509.6	3.97	-0.11
6.4	499.3	5.8	481.9	515.2	5.86	-0.16
14.94	498.9	12.6	461.5	532	12.68	-0.28

Data are averages of 500 simulations. Clustered trap configurations were not evaluated at 14.94 trap spacing (J=32 traps) as it was equivalent to a regular trap configuration

A2.8. For σ = 1 km, summary of estimates of $\hat{\sigma}$ in the clustered and sequential trap configurations when trap spacing increased from 4.71 to 14.94 km (J=128 to 32 traps) and N=500.

	Clustered						Sequential					
	Mean	SD	Min	Max	RMSE	MNB	Mean	SD	Min	Max	RMSE	MNB
p=0.20												
4.71	1.00	0.07	0.81	1.27	0.07	-0.49	1.00	0.08	0.76	1.25	0.08	-0.75
5.24	1.01	0.10	0.76	1.40	0.10	0.08	1.00	0.10	0.71	1.32	0.10	-0.75
6.4	0.99	0.14	0.64	1.60	0.14	-2.99	0.99	0.14	0.57	1.38	0.14	-3.60
14.94	N/A						0.99	0.25	0.49	1.81	0.25	7.65
p=0.10												
4.71	1.01	0.14	0.63	1.52	0.15	-0.76	0.99	0.14	0.67	1.45	0.14	-2.83
5.24	1.02	0.20	0.63	1.83	0.20	-1.15	1.00	0.17	0.62	1.69	0.17	-3.03
6.4	1.00	0.27	0.52	2.02	0.27	-6.87	*0.96*	*0.24*	*0.53*	*2.63*	*0.24*	*10.60*
14.94	N/A						*1.02*	*0.31*	*0.42*	*1.75*	*0.31*	*8.55*
p=0.05												
4.71	*1.06*	*0.28*	*0.59*	*1.98*	*0.28*	*-0.37*	*1.01*	*0.24*	*0.55*	*2.44*	*0.24*	*-5.00*
5.24	*1.09*	*0.36*	*0.46*	*2.19*	*0.38*	*1.25*	*1.02*	*0.28*	*0.53*	*2.47*	*0.28*	*5.32*
6.4	*1.07*	*0.44*	*0.47*	*2.51*	*0.44*	*7.86*	*0.98*	*0.31*	*0.45*	*1.89*	*0.31*	*12.29*
14.94	N/A						*0.96*	*0.34*	*0.28*	*1.59*	*0.34*	*20.82*

See footnote for A2.5 for number of iterations used for the italicized estimates.

A2.9. For σ = 5 km, summary of estimates of $\hat{\sigma}$ in the regular, clustered and sequential trap configurations when trap spacing increased from 4.71 to 14.94 km (J=128 to 32 traps) and N=500.

	Regular						Clustered					
	Mean	SD	Min	Max	RMSE	MNB	Mean	SD	Min	Max	RMSE	MNB
p=0.20												
4.71	5	0.04	4.89	5.16	0.04	-0.05	5	0.04	4.85	5.11	0.04	-0.08
5.24	5	0.05	4.86	5.19	0.05	-0.03	5	0.05	4.85	5.14	0.05	-0.01
6.4	5	0.06	4.84	5.19	0.06	-0.04	5	0.06	4.83	5.17	0.06	-0.03
14.94	5.006	0.105	4.644	5.308	0.105	0.071	N/A					
p=0.10												
4.71	5	0.06	4.86	5.31	0.06	0	5	0.07	4.77	5.22	0.07	-0.08
5.24	5	0.08	4.77	5.27	0.08	-0.07	5	0.08	4.78	5.24	0.08	-0.02
6.4	5	0.1	4.73	5.27	0.1	-0.13	4.99	0.1	4.74	5.33	0.1	-0.19
14.94	5.01	0.17	4.515	5.49	0.17	-0.01	N/A					
p=0.05												
4.71	5	0.1	4.73	5.34	0.1	-0.04	4.99	0.1	4.66	5.47	0.1	-0.19
5.24	4.99	0.13	4.64	5.39	0.13	-0.25	5	0.12	4.65	5.35	0.12	0.03
6.4	4.99	0.17	4.49	5.48	0.17	-0.25	4.99	0.17	4.55	5.49	0.17	-0.36
14.94	5.01	0.3	4.03	5.84	0.3	-0.1	N/A					

A2.9 Continued

	Sequential					
	Mean	SD	Min	Max	RMSE	MNB
p=0.20						
4.71	5	0.04	4.87	5.13	0.04	-0.03
5.24	5	0.05	4.86	5.16	0.05	0
6.4	5.01	0.06	4.82	5.21	0.06	0.09
14.94	5	0.09	4.77	5.28	0.09	-0.03
p=0.10						
4.71	5	0.07	4.83	5.2	0.07	-0.04
5.24	5	0.08	4.8	5.27	0.08	0.06
6.4	5.01	0.1	4.72	5.33	0.1	0.06
14.94	4.99	0.16	4.56	5.45	0.16	-0.29
p=0.05						
4.71	5	0.1	4.68	5.28	0.1	-0.08
5.24	5	0.13	4.59	5.39	0.13	-0.01
6.4	5.01	0.17	4.51	5.51	0.17	0.03
14.94	4.98	0.3	4.07	5.77	0.3	-0.77

Data are averages of 500 simulations.

A2.10. For σ = 10 km, summary of estimates of $\hat{\sigma}$ in the regular, clustered and sequential trap configurations when trap spacing increased from 4.71 to 14.94 km (J=128 to 32 traps) and N=500.

	Regular						Clustered					
	Mean	SD	Min	Max	RMSE	MNB	Mean	SD	Min	Max	RMSE	MNB
p=0.20												
4.71	9.99	0.3	498	500	0.31	-0.02	10	0.05	9.81	10.16	0.05	-0.03
5.24	10	0.06	9.81	10.15	0.06	0	10	0.06	9.76	10.2	0.06	-0.03
6.4	10	0.07	9.76	10.21	0.07	-0.03	10	0.08	9.78	10.25	0.08	0.01
14.94	10	0.11	9.7	10.36	0.11	0	N/A					
p=0.10												
4.71	9.99	1.07	495.75	501.09	1.14	-0.08	10	0.08	9.74	10.21	0.08	-0.01
5.24	10	0.09	9.74	10.23	0.09	0.01	10	0.09	9.67	10.28	0.09	-0.01
6.4	9.99	0.11	9.64	10.38	0.11	-0.08	10	0.11	9.67	10.35	0.11	-0.01
14.94	10	0.17	9.49	10.54	0.17	-0.02	N/A					
p=0.05												
4.71	10	3.02	491.31	507.18	3.04	-0.08	10	0.11	9.58	10.33	0.11	-0.04
5.24	10.01	0.13	9.59	10.34	0.13	0.06	10	0.13	9.54	10.45	0.13	-0.05
6.4	9.99	0.16	9.53	10.46	0.16	-0.09	10	0.18	9.48	10.48	0.18	-0.06
14.94	9.99	0.27	9.03	10.77	0.27	-0.21	N/A					

A2.10 Table Continued

	Sequential					
	Mean	SD	Min	Max	RMSE	MNB
p=0.20						
4.71	10	0.05	9.84	10.17	0.05	0
5.24	9.99	0.06	9.84	10.17	0.06	0.03
6.4	10	0.07	9.77	10.23	0.07	0.01
14.94	10	0.11	9.69	10.28	0.11	0.01
p=0.10						
4.71	10	0.07	9.8	10.26	0.07	-0.01
5.24	9.99	0.09	9.76	10.28	0.09	0.02
6.4	9.99	0.11	9.7	10.37	0.11	0.02
14.94	10	0.17	9.58	10.59	0.17	-0.01
p=0.05						
4.71	10	0.11	9.67	10.44	0.11	-0.01
5.24	9.99	0.14	9.57	10.44	0.14	0.03
6.4	10	0.15	9.57	10.53	0.15	0
14.94	10.01	0.26	9.34	10.75	0.26	-0.05

Data are averages of 500 simulations.

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